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Photo by Thresh Kapoor



Sambar Fawn drinking from Ramganga in Corbett National Park

Photo - A.S. Negi



A Chinchu tribal couple in Nagarjun Sagar - Sriselam Tiger Reserve of Andhra Pradesh

Photo - A.S. Negi

Editorial

There is a hot talk of climate change all over the globe irrespective of cast, creed, religion and country which they belong to. The Copenhagen Summit might have failed to get assurances from developed and developing countries for emission reduction actions but it has made a major impact on human minds in terms of awareness about the disastrous effects of climate change on all forms of life. A realization has also dawned that the negative impacts of climate changes are not imaginary and they have started impacting the lives of millions of people around the globe.

Starting from Rio conference in 1992 that produced the UN Frame Work Convention on Climate Change (UNFCCC) to acceptance of Kyoto Protocol in 1997 and Kyoto becoming operative in 2002 (With US and Australia refusing to ratify), the UN's Intergovernmental Panel on Climate Change warned in 2007 that the crisis is moving imminently. IPCC said that the world must restrain global temperatures from going more than 2 degrees above preindustrial era to have half a chance of preventing irreversible changes on earth.

The Copenhagen Summit held recently (Dec 09) was attended by 193 countries but it has become clear that political move on climate change is not likely to yield any positive impact as all countries whether developed or developing or even under developed were little concerned about the negative impact of climate change on the humanity as a whole and they had only political concerns of their countries back home which override every thing. Political class has become too narrow in their thinking and their only concern seems to be grabbing power and enjoying its fruits at all costs. There were too many protests outside the conference venue by concerned citizens from different counties including some NGOs of global reputation who wanted positive outcomes from the conference but that was not to happen.

The only hope is from the aware citizens of the world. There is an example of a US couple Colin Beevens and Michelle conlins who drastically changed their life style doing their best not to create trash, cause carbon dioxide emission or pour toxin into the water supply and by buying only local produce. They rode bikes to get places, walked up and down the nine flights of stairs to their apartment and cooked meals with wood from local farmers market. They also got rid of their television and bought no new clothes for themselves or their 18 month old daughter Isabella. They even switched off the electricity. They continued with their lifestyle of "No Impact Man" strictly for one year. They began their experiment in late 2005 and they still try to live sustainably although not so radically. In US where the culture is not equipped to support sustainable

living, the couple drew media attention and they were criticized rather than being encouraged.

The above example only shows that the consumerism culture in US has reached a no return point and it will be difficult to expect much from people of their kind to contribute in mitigating efforts. We in this county are lucky to still have about 65 to 70% of our population which has very light ecological foot print as their life style is still very simple. All these families in our county are "no impact families" if we go by above example of the American couple. The remaining 30% people in our county have almost reached the no return point in their lifestyle like most Americans but the most worrying phenomenon is not just these 30% but unending addition of more and more neo rich to this list from the unending sea of population that we have. Our consumer class has already overshoot the numbers of total population of US. I am sure our cosmopolitan cities are using more energy and water than the rest of the county.

The most worry some picture emerges from the social inequalities resulting from the above scenario which causes insurgencies that breed hatred between have-nots and haves. This creates a cycle of protecting the haves with the public money that could have gone into the development of county side. This is an unending cycle with little hope of reversal for the better.

Let us examine, who are the people most vocal on the environmental front. It is anybody's guess that they are from the hardcore consumer class. Can we ask them whether they can change their own life style to sustainable one? If not then what right do they have to preach those who already have sustainable lifestyle? Do they hope that the class which has already reached an unsustainable level will listen to them?

The solution does not lie in criticizing this or that class of people of this or that group of counties. It solely lies in abilities of individual to take a vow that they on their part will only lead a sustainable lifestyle creating least ecological imbalances. We have to go back to our own Mahatma Gandhi who wore a two and a half yard of lion cloth to cover his body not because he could not afford more but because he knew that his share among his countrymen was just that and not more. He always said that we have enough for our needs but not enough for our greed.

(A.S. Negi)

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Bharal or Blue Sheep

(*Pseudois nayaur*)

Bharal is a Himalayan mammal originally classified as sheep. Its physical characteristics are so intermediate between sheep and goats that taxonomists have had trouble classifying it. G.B. Schaller says that Bharal are basically goats. It is also found in trans-Himalayas. It is still common in some places as far apart as Eastern Ladakh and Bhutan. It is a medium built animal found beyond tree line in groups of varying sizes. It is close to snowline and its grazing ground consists of steep to very steep slopes. It has a very thick coat to protect it from the harsh cold climate of its habitat. It is main prey of Snow leopard.

ELEPHANT BULLS OF RAJAJI-CORBETT ELEPHANT RANGE

A.J.T. JOHNSINGH AND A. CHRISTY WILLIAMS

He towered over the tallest female in the group by almost one and half a foot. He stood on the edge of the Ramganga reservoir escorting a young adult female. He looked every inch a behemoth. His grace, sheer size and embodiment of power deserved the attention he was getting from us. He was one of the members of a group of elephants we were watching on Dhikala chaur in Corbett Tiger Reserve one late May evening.

The sun had just set behind a chain of hills on the far side of the Ramganga reservoir, leaving the sky painted with a hue of reddish gold. The lighting on the bull made it very picturesque. His musth flow was coming to an end as indicated by the two small wet patches along with traces of dried flow down the sides of his massive head. His interest in the young adult female was conspicuous as he always kept to her side. When she waded into the reservoir he plunged in after her. It was then that we realised the fear his immense size can generate on a smaller and younger bull. The young bull, who was already in the water, hastily moved away when it became apparent to him that he was between the female and the mammoth. The young bull moved around the pair in a wide circle and eventually got out of the water.

The mammoth was fully aware of the presence of the young bull and the other members of the group but was totally unconcerned about them. He submerged himself in the water alongside the female and gently nudged her. After a few minutes he waded towards the shore churning and splashing the water all along and then came on to the dry land. The young bull, although 30m away, hurriedly moved away when the mammoth turned in his direction although totally indifferent to the young bull's presence. The twilight was soft but bright enough for us to clearly see the long massive tusks of the mammoth. The wear on the right tusk indicated that he had used it much more than the left one. As the night fell the mammoth strolled away from the group towards the forest. He walked with great dignity and poise and we painfully realized that, due to extensive poaching of tuskers, such magnificent bulls have become rare in many of the elephant ranges in India. We were fortunate that it was not the last encounter we had with him when we studied elephants for the next few days in Dhikala.

Although many articles and books, both popular and scientific, have been written on Asian elephants, the life of bulls in the natural environment has not been documented for many elephant ranges. This is largely due to the paucity of research on bulls and to some extent to the scarcity of adult bulls in most ranges due to poaching. We present here some fascinating information on the elephant bulls of Corbett Tiger Reserve and the adjoining elephant habitat. Only the bulls make Rajaji and Corbett Tiger Reserve a continuous elephant habitat entity, by moving across the flimsy corridors, which are disintegrating and shrinking day by day.

Not long ago the elephant habitat in the state of Uttar Pradesh was continuous from Katarniaghat in Bahraich Forest Division in the east to river Yamuna in the Shivalik Forest Division in the West. Over the decades, as a result of the growing demand for more land for the increasing human population, this contiguity was broken. Now there are six isolated elephant populations. The major population of elephants in this tract, about 800, occurs in the Rajaji-Corbett Elephant Range. This range, about 3000 km², spans from Kosi river, which forms the eastern boundary of Corbett Tiger Reserve to river Yamuna on the West. This forest tract includes the present Shivalik forest Division, the proposed Magnolia Esteem Gardania, Sahakara Nagar, Bangalore - 92

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Rajaji National Park (which include the three former Wildlife Sanctuaries: Chilla, Motichur and Rajaji), Corbett Tiger Reserve, and parts of Lansdowne, Bijnor and Kalagarh Forest Divisions.

We have urged time and again that elephant conservation in Uttar Pradesh should focus on the large Rajaji-Corbett population and its habitat which has already been broken into three isolated areas due to two major developmental projects. This includes the 14 km. Kunaun-Chilla Power channel which was constructed on the eastern bank of Ganges in early 1970s. Around the period when the power channel was built there were developmental projects such as the establishment of Hindustan Antibiotics factory, Raiwala army camp, and the settlement of evacuees from the submersion area of Tehri dam village. These have made the Chilla-Motichur corridor totally unfit for elephant herds to move between Chilla and Motichur across the Ganges.

The Second important development that has restricted the movement of elephants between Rajaji and Corbett is the Kotdwar-Lansdowne road which runs across the narrow Rajaji-Corbett corridor parallel to the Khoh river. This road construction has resulted in steep edges and building of walls which impede crossing by elephants. This hilly corridor is used only by bulls. Fortunately the elephant bulls still migrate across the power channel and the road thereby bringing about genetic exchange between the otherwise isolated populations. We have predicted that this genetic exchange would not continue for long if the fragile habitat continuity between these is not immediately strengthened by consolidating the corridors.

Six years ago, one summer evening, as the dusk was gathering. Mr. Wesley Sunderraj, a researcher from the Wildlife Institute of India, was returning to Kotdwar walking along the Khoh river. He spotted an elephant bull, a tusker, coming along a valley from the direction of the Rajaji National park towards the Khoh river. Wesley photographed the bull and stayed near the river to find out whether the bull would cross the river. By the time the bull came close to the river it became so dark that Wesley had to abandon his observation. He, however, went back to the same area early the next morning and picked up the trail of the tusker. The elephant had crossed the river, Kotdwar - Lansdowne road and walked in the direction of the Corbett Tiger Reserve.

This was the only bull that Wesley had seen using the corridor during the two year period that he studied the elephant corridor between Rajaji National Park and Corbett Tiger Reserve. The corridor is to the west of Khoh river. He discovered that the movement of cow group across the corridor was absent due to the steep terrain, which the calves cannot negotiate, and the disturbances caused by people. "The cow groups, just to ensure the safety of the calves, avoid areas of disturbances even if they are rich in food resources. Bulls, as they do not care either for the safety of the calves or for the group, could negotiate even areas of high disturbance in the cover of darkness. Wesley, however, concluded that the growing disturbances in the corridor area - grass, bamboo, fodder and wood collection - may one day stop even the bulls moving across Rajaji Corbett Corridor. If that happens, the genetic exchange between the populations on the east and west of Khoh river would come to an end forever.

The number of socially and sexually mature elephant bulls in a population is an important factor in deciding the genetic virility of the population. Sadly in many elephant ranges in India, a good example being Periyar Tiger Reserve, uncontrolled poaching of tuskers has drastically depleted the bulls leading to a disproportionate sex ratio. The sex ratio reported in Periyar Tiger Reserve is 1 male to 120 females. Although there are some tuskless bulls (makhnas) in the population this disproportionate sex ratio definitely can have two disastrous consequences. One is that a proportion of females may not be able to mate, inspite of the fact that the elephant bulls are polygynous. The other is, the cows, which can make a decision in selecting the bull, in the absence of mature bulls, may allow even younger bulls to mate. Such matings in a large scale and for several generations, which is bound to happen in a place like Periyar, can eventually drastically affect the quality - size and vigour - of the elephants.

Corbett Tiger Reserve, fortunately, is one of the few places in Asia where the tuskers have not come under the shadow of the poachers gun. As a result there is about 1 bull for every 3 cows and in April 1996 when we watched elephants, 80% of the cows had either calves or young juveniles. In Periyar in 1990 only about 30 percent of the cows were reported to be accompanied by young. When a cow comes into oestrous several bulls compete for her and only the best bull – sexually and socially mature, fully grown, virile and aggressive in that locality is able to mate with the female and thereby pass on the best genes to the population. This biological phenomenon warrants continued protection to the elephant bulls.

When the bulls are around 20 years old, they begin to experience a condition known as musth. The phenomenon of musth was first described in captive Asian elephants and though physiologically well explained, its role in the ecology of elephants was not understood for a long time. The period of musth may last from a few days to more than three months, depending on the age of animal and its body condition. The body condition of bulls coming into musth is usually very good. Studies have shown that during musth level of the male hormone, testosterone, goes up and bulls usually range far and wide in search of females in oestrous. Some researchers have compared musth with rutting. Musth bulls are usually very aggressive towards other bulls and guard oestrous females very vigorously. Bulls not in musth are also known to mate successfully but the urge to search for females in oestrous is very strong in musth males.

One morning in Dhikala, while driving to the chaur, we saw a 25-year-old bull standing nervously at the edge of a forest. We stopped the vehicle and watched him. After a minute or so he started running into the chaur. The reason became apparent when we saw another bull about 30 to 35 years old, in musth with thick short tusks. He was walking threateningly from the forest edge towards the younger bull which beat a hasty retreat from the area into the chaur. When we followed the musth bull, we found him courting a female. The other members of the group were mostly hidden by the vegetation. A little later, loud vocalizations in the form of rumblings and squeals and trumpets were heard. We grabbed our binoculars and started to scan the group. The musth male had mounted the female and was mating with her. After about 40 seconds, he dismounted and we again could hear excited vocalizations. We quickly hurried over to the group and took a good look at the musth male. He was in very good physical condition. He kept very close to the female and guarded her throughout the three days we watched him. During our observations we saw the musth bull chasing at least eight different adult bulls of varying ages from his vicinity.

Four years ago, one winter evening, we were on the trail of a large radio-collared bull elephant in the Chilla part of Rajaji National Park. He was a massive animal over 10 feet high and little over five tons in weight. We fondly called that 46 year old bull, 'Big Boss'. Finally, when we located him, he was with a cow group vigorously courting female. Musth profusely flowed down both his cheeks. A cow elephant comes into oestrous only for two or three days in a year and if it conceives may not cycle again for two or three years. This means that very few cows may be in oestrous at a given time. For a long time researchers were wondering how adult bulls, especially ones in musth, find females in oestrous. Catherine Payne and her colleagues, while working on infrasound communication by elephants in Etosha National Park Namibia, discovered that females in oestrous give a peculiar call, inaudible to humans. They have speculated that elephant bulls 'hear' this, and are able to home in on females in oestrous. During the 3-4 month period when Big Boss was in musth he wandered over an area of about 200 km² and during this period we located him with eight different female groups. What he was doing was obvious – roaming in his home range looking for receptive females. By the time the winter coolness had given way to summer heat, his body condition declined, he lost his great urge for sex and became solitary.

Dr. Justus Joshua, a researcher from the Wildlife Institute of India, then studying elephants in Rajaji National Park, observed a great contraction in the home range of Big Boss – from 200 km² in winter to about 20 km² in summer. There was a total change in the behaviour of the elephant too. In summer Big Boss spent the whole day resting in a cool valley far away from any form of human disturbance. He stirred out of his hide only after darkness had descended. Thereafter, he went to a small water hole in the dry river bed, dug out by gujjars, and drank his fill. This took almost an hour. He also threw water on his body several times to cool himself. Thereafter he disappeared into the forest to feed, largely on the bark and branches of the trees which he pushed down effortlessly.

Early one morning, when Justus tracked down Big Boss, the bull was still feeding and there was a cow group with him. Interestingly when Big Boss debarked and pushed down a tree the entire group gathered around and started feeding on the tree, leaving very little space for Big Boss. This made him move away and find another tree to debark and push down. Possibly to the consternation of Big Boss even this tree was taken over by the group. Then it occurred to Justus that one of the reasons for Big Boss leading a solitary life in summer (the major reason was lack of sexual desire) could be to avoid competition with cow groups over food trees which are hard to come by in a degraded and heavily disturbed habitat like Chilla.

We have quantified debarking by elephants in Rajaji National Park and Corbett Tiger Reserve. Debarking begins in winter and reaches it's maximum in summer. Summer in most elephant ranges is characterised by a lack of forage and water. This is also the time when the elephants suffer from a lack of calcium in their diet. This makes them debark and feed on cambium, the internal tissue of the bark, along with which plant sap rich in calcium flows from the root system to the canopy. Interestingly, debarking is much more common in Rajaji National park than in Corbett Tiger Reserve. We attribute this to the immense biotic pressures, like wood cutting, lopping and cattle grazing, which have led to severe degradation of the habitat in most places. The reason for the area around Dhikala not having many incidents of debarking is due to the rich forage that the Ramganga Valley offers even in summer. The streams, rivers and the soil around Dhikala may be richer in calcium than in Rajaji National Park. this, however, needs to be studied.

The tragic end of Big Boss reminds us that all good and bad things in life should come to an end. In November 1995, the 50 year old Big Boss came into musth and he followed a young female who was in oestrous and in the company of a large herd. According to the wildlife guards the herd had about 60 elephants and there were 3-4 bulls with the herd. On the eventful day, when Big Boss courted the female, the other bulls joined together and attacked him. The fight raged over the river beds and hills, through forests and open areas. The guards tried to disperse the bulls by firing in the air but their efforts were in vain. Big Boss fought valiantly but the fight was uneven. In one place, Big Boss, who should have been extremely tired by this time, slipped and fell into a narrow nallah from where he could not get up. This made him totally vulnerable to his attackers, and exploiting his hapless situation, one bull, which was in its prime and had dagger – like tusks, gored him to death. Thus ended the life of a magnificent and noble bull (he had allowed us to approach him very closely on several occasions) who strolled through the Chilla forests in all his majesty for more than two decades.

The elephant bulls of Corbett Tiger Reserve and the adjoining areas are a peerless asset, which need to be assiduously protected for ecological and aesthetic reasons. The sight of magnificent bulls, strolling across the Dhikala chaur giving the impression that they are lords of the Reserve and afraid of none, can thrill any visitor. Their trumpets and fights, both mock and real, can bring a vision of a primordial world to an observer when woolly mammoths roamed over the land and man was a hunter and as well as prey.

Much needs to be done to ensure the future of these bulls. Effective protection should be continued. Corridors across the Ganges and Khoh rivers should be strengthened so that the bulls

ईकोटूरिज्म, वन्य जीव पर्यटन की समस्याएँ व भावी सम्भावनाएँ

आनन्द सिंह नेगी भा0व0से0 (से0नि0)

1. ईकोटूरिज्म का आशय:

इसके अन्तर्गत प्राकृतिक दृश्यों के अवलोकनार्थ किया गया भ्रमण, साहसिक भ्रमण तथा वन्य जन्तुओं व वनस्पतियों को उनके प्राकृतिक वास स्थल में अवलोकन हेतु किया गया भ्रमण सम्मिलित है। दुर्गम व बीहड़ प्राकृतिक स्थलों का भ्रमण उनकी जैव विविधता को निहारने तथा वहाँ के सांस्कृतिक परिवेशन का अध्ययन करने के लिए किया जाता है। वर्तमान समय में ईकोटूरिज्म शब्द का प्रयोग संरक्षित क्षेत्रों, जैसे – राष्ट्रीय उद्यानों तथा पशु विहारों का भ्रमण करने वाले सैलानियों के संदर्भ में किया जाता है। प्राचीन समय से ही भ्रमण मुख्यतः आनन्द लेने के लिए किया जाता रहा है तथा भ्रमणकारी स्वतंत्र रहकर विचरण करना पसन्द करता है। परन्तु जब ईकोटूरिस्ट की बात की जाय तो हमारे दिमाग में भ्रमण करने वाले की जो छवि बनती है वह ऐसा व्यक्ति है जो आनन्द के साथ-साथ कुछ जानकारी करना भी चाहता है तथा जो अपने भ्रमण से उस क्षेत्र विशेष के समाज तथा पर्यावरण पर पड़ने वाले प्रभाव के बारे में भी जागरूक है। ऐसा पर्यटक प्रायः भ्रमण के दौरान आने वाली परेशानियों को खुशी से झेलना पसन्द करेगा तथा साधारण परिस्थितियों व सुविधाओं से सन्तुष्ट होगा। पर्यटक को साहसी व उत्साही होना भी आवश्यक है। इतना ही नहीं पर्यटक को प्राकृतिक संरक्षण में अपना सहयोग देने के लिए भी तत्पर रहना चाहिए। पर्यटन के बाद वापस लौटने पर पर्यटक को उपभोक्तावाद तथा प्राकृतिक संरक्षण के आपसी सम्बन्ध का ज्ञान हो जाना चाहिए तभी उसके प्रकृति पर्यटक से प्रकृति प्रेमी बनने की आशा की जा सकती है।

2. ईकोटूरिज्म के अवसर तथा प्रयत्न:

भारत प्राकृतिक विविधता का देश है जिसमें अनेक प्रकार की जलवायु व वास स्थलों में अनेक प्रकार की वनस्पति व जीव जन्तु पाए जाते हैं। भारत से अधिक जैव विविधता संभवतः केवल कुछ अफ्रीकी देशों में ही मिलेगी। साथ ही हमारे देश में इस जैव विविधता को बचाने के भी अनेक प्रयास किये जा रहे हैं। हमारे देश में सन् 1970 तक मात्र 10 राष्ट्रीय उद्यान एवं 127 अभयारण्य थे जिनके अन्तर्गत मात्र 25000 वर्ग कि०मी० क्षेत्र था। सन् 1991 तक यह क्षेत्रफल बढ़कर 1,32,000 वर्ग कि०मी० हो गया था जिसके अन्तर्गत 66 राष्ट्रीय

उद्यान व 421 पशु विहार सम्मिलित थे वर्तमान में हमारे देश में संरक्षित क्षेत्रों (जिनमें संरक्षित आरक्षण तथा कम्यूनिटी आरक्षण भी सम्मिलित हैं) की संख्या 658 हो गई है जिनके अन्तर्गत कुल 158745 वर्ग कि०मी० क्षेत्र है। सरकार इन संरक्षित क्षेत्रों को बढ़ाने के लिए प्रयत्नशील हैं तथा उसका लक्ष्य देश के भौगोलिक क्षेत्रफल का 5.6 प्रतिशत क्षेत्र अर्थात् 1,83,000 वर्ग कि०मी क्षेत्र इसके अन्तर्गत लाने का है जिसमें लगभग 147 राष्ट्रीय उद्यान एवं 633 पशुविहार होंगे।

देश की अपार प्राकृतिक सम्पदा एवं सांस्कृतिक आकर्षणों के बावजूद हमारे यहां कुल विश्व के पर्यटकों का मात्र 0.31 प्रतिशत पर्यटक ही पहुंच पाता है। वन्य जीव एवं संरक्षित क्षेत्र उक्त का मात्र एक छोटा अंश ही आकर्षित कर पाते हैं। इसका मुख्य कारण साधनों की कमी, दंगे-फसाद व समय-समय पर होने वाली गड़बड़ियाँ तथा प्रचार-प्रसार की कमी है। सरकारी तंत्र के विभिन्न स्तरों पर होने वाले विलम्ब भी इसके लिए जिम्मेदार ठहराए जा सकते हैं।

3. कठिनाइयाँ:

लगातार बढ़ती हुई जनसंख्या एवं पालतू पशुओं का जो दबाव हमारे संरक्षित क्षेत्रों पर पड़ रहा है उससे हमारे संरक्षित क्षेत्र प्राकृति साधनों के छोटे-छोटी द्वीप मात्र बन कर रह गए हैं जो चारों तरफ से लालची निगाहों से घिरे हैं। वैधानिक रोक-टोक के कारण आसपास की जनता, जो इन क्षेत्रों से अपनी दैनिक आवश्यकताओं की पूर्ति करती रही है, पर इन क्षेत्रों में जाने पर पाबन्दी लग गई है। इन स्थानीय लोगों के मन में प्राकृतिक संरक्षण की बात बिठाना असंभव हो जाता है। विशेषकर जब वे बाहरी सैलानियों को बिना रोक टोक के इन क्षेत्रों में आनन्द के लिए घूमते हुए देखते हैं। इससे संरक्षित क्षेत्रों के प्रबन्धकों व स्थानीय जनता में टकराव की स्थिति उत्पन्न हो जाती है। अतः यदि इन जैव विविधता युक्त संरक्षित क्षेत्रों को बचाया जाना है तो टकराव के क्षेत्रों को कम करना होगा तथा पर्यटन की ऐसी नीति बनानी आवश्यक होगी जिससे स्थानीय जनता को पर्यटन से होने वाले लाभों में भी उचित हिस्सा मिल सके। स्थानीय जनता की नाराजगी से इन क्षेत्रों को इतनी क्षति हो सकती है जितनी पर्यटन के कुप्रबन्ध से कभी नहीं होगी। इसलिए किसी भी संरक्षित क्षेत्र की पर्यटन नीति व योजना में स्थानीय जनता की आवश्यकताओं का ऐसा समावेश होना चाहिए ताकि क्षेत्र के संरक्षण को सर्वाधिक महत्व मिल सके। ध्येय यह होना चाहिए कि जनता में संरक्षण के प्रति जागरूकता उत्पन्न हो तथा संरक्षित क्षेत्रों के लिए जनता का अधिक सहयोग प्राप्त किया जा सके। इस उद्देश्य की पूर्ति हेतु निम्न प्रयास किए जा सकते हैं :

1. बैंक पैक पर्यटक और मध्यम व निचली आय सीमा के पर्यटकों के लिए भोजन व आवास की व्यवस्था हेतु स्थानीय लोगों की सहकारी संस्थाओं की स्थापना करना तथा इच्छुक व्यक्तियों को 'होम स्टे' के लिए प्रोत्साहित करना तथा प्रारम्भ में उन्हें इस हेतु अनुदान व सस्ते ऋण की व्यवस्था करना।
2. स्थानीय शिक्षित बेरोजगार युवकों को प्रकृति गाईड का प्रशिक्षण प्रदान करना तथा उन्हें पर्यटकों के साथ गाईड के रूप में उपयोग में लाना।
3. स्थानीय हस्तकला व स्थानीय वस्तुओं की बिक्री के लिए सहकारिता संस्थाएं बनाकर स्थानीय लोगों की आय के साधनों में वृद्धि करना।
4. स्थानीय लोक गीतों व लोक नृत्यों से पर्यटकों का मनोरंजन करके अतिरिक्त आय के साधन तैयार करना।
5. स्थानीय स्कूल/कालेज के विद्यार्थियों तथा स्वयंसेवी संस्थाओं को संरक्षित क्षेत्र के प्रकृति चित्रण (Interpretation) कार्यों से सम्बद्ध करना।
6. संरक्षित क्षेत्र के आस-पास के गावों में ईको-डेवलपमेंट कार्य करना जैसे — भूमि संरक्षण, पौध रोपण, सौर ऊर्जा के साधन उपलब्ध कराना, चारागाह विकास, फालोद्यान, रेशम उद्योग, मधुमक्खी पालन, मशरूम उगाना, स्थानीय हस्तकला को प्रोत्साहन देना, मछली पालन, पशुपालन, लघु सिंचाई, बच्चों व महिलाओं के लिए आवश्यक स्वास्थ्य सेवायें, पशुओं के लिए चिकित्सा, मुर्गी पालन आदि। यह कार्य स्थानीय आवश्यकताओं के अनुसार किए जा सकते हैं। यह कार्य पार्क प्रबन्धकों तथा सरकारी विभागों द्वारा ही नहीं बल्कि स्वयंसेवी संस्थाओं, स्थानीय पर्यटक रिजार्ट्स आदि के द्वारा भी किए जाने चाहिए।
7. किसी संरक्षित क्षेत्र में ईको-टूरिज्म से जो धनराशि पार्क प्रबन्धकों द्वारा अर्जित की जाय उसका अधिकांश भाग ईकोडेवलपमेंट में व्यय किया जाये। वर्तमान समय में ईकोटूरिज्म से अर्जित धन का उस क्षेत्र के लिए प्राविधानित बजट से कोई सम्बन्ध नहीं है। प्राइवेट टूरिस्ट रिजार्ट्स (Tourist resorts) तथा अन्य टूर प्रमोटर्स (Tour operators) से 5 से 10 प्रतिशत कर लेकर उक्त कार्यों पर खर्च किया जाना भी उचित होगा।
8. आस पास के ऐतिहासिक, सांस्कृतिक, धार्मिक, प्राकृतिक स्थलों को प्रोत्साहित करना तथा उन्हें इको पर्यटन से जोड़ना ताकि स्थानीय लोगों को अधिक से अधिक लाभ मिल सके।

9. संरक्षित क्षेत्रों के अन्तर्गत तथा आस पास के रिजर्ट्स में सरकारी व गैर सरकारी प्रयासों से संचालित होटलों व जलपान गृहों में सेवा प्रदान करने हेतु स्थानीय लोगों को नियुक्त करना।

4. ईकोटूरिज्म में किन बातों पर विशेष ध्यान दिया जाय:

साधारण पर्यटन एवं ईको-टूरिज्म में मुख्य अन्तर यह है कि ईको-टूरिस्ट द्वारा जिन क्षेत्रों का भ्रमण किया जाता है वे अत्यन्त संवेदनशील हैं तथा उन क्षेत्रों का संरक्षण इसलिए किया जाता है ताकि जो जैव-विविधता (biodiversity) करोड़ों वर्षों में उत्पन्न होकर वर्तमान स्वरूप में पहुंची है उसको हमेशा के लिए बनाए रखने का प्रयास किया जाय। इन क्षेत्रों में न केवल बड़े जानवर जैसे - हाथी, शेर, भालू, गैंडे, बाइसन आदि वास करते हैं बल्कि छोटे-छोटे जानवर, चिड़िया, कीड़े-मकोड़े तथा अनेक पेड़ पौधों के भी आवास यहीं हैं। इसके अलावा यह क्षेत्र आस पास की आबादी, विशेषकर भारत के 6 करोड़ से अधिक आदिवासियों की अनेक आवश्यकताओं जैसे - पानी, चारा, जलौनी लकड़ी, भोजन व रेशा आदि की भी पूर्ति करते हैं। अतः ईकोटूरिस्ट को इन क्षेत्रों से पूर्णतः भिन्न होकर जाना चाहिए तथा इस विषय में हमेशा के लिए संवेदनशील हो जाना चाहिए।

आम पर्यटकों को मात्र बड़े जंगली जानवरों जैसे हाथी, शेर, गैंडा, बाइसन आदि देखने की ललक रहती है जिससे वे अन्य इतनी ही महत्वपूर्ण जीव जन्तुओं जैसे हिरन, चिड़िया, कीड़े-मकोड़ों, सरीसर्प पानी के जन्तु तथा अनेक प्रकार की वनस्पति पर ध्यान नहीं दे पाते हैं। प्रकृति को इसके विभिन्न रंग-रूप में देखना उतना ही दिलचस्प व कौतुहलपूर्ण है जितना किसी बड़े जंगली जानवरों को देखना। पेड़ पौधों की जातियां व उप जातियां, पौधों का सक्सेसन (succession), विशालकाय वृक्ष, घने जंगल, पत्तियों व फूलों के बदलते रंग रूप, स्वच्छ आकाश में रात्रि को अनेक तारे, चिड़ियों की चहचहाट, जानवरों की अलार्मकाल, रात्रि को सुनाई देने वाली बोलियां, नदियों की कलकलाहट, रंग-बिरंगे कीड़े-मकोड़े व तितलियाँ, जानवरों के निशान, दीमक की कारस्तानियां आदि-आदि किसी के भी मन में अविस्मरणीय छाप छोड़ती हैं।

संरक्षित क्षेत्रों में विभिन्न वनस्पतियों व जीव-जन्तुओं के विलक्षण सामन्जस्य को समझने तथा विभिन्न कौतुहलपूर्ण क्षणों का आनन्द लेने के लिए यह आवश्यक है कि पर्यटक अपने आचार-व्यवहार को भी तदनुसार परिमार्जित करें। इन क्षेत्रों में किसी भी क्षण को पिकनिक के रूप में नहीं मानना चाहिए। पर्यटक की ओर से थोड़ी लापरवाही तथा आलस्य उसे ऐसे अनुभवों से वंचित कर सकते हैं जो जीवन पर्यन्त दोबारा प्राप्त करना असम्भव है।

इन्हीं सब बातों को मध्यनजर रखते हुए संरक्षित क्षेत्रों में भ्रमण हेतु कुछ भिन्न कानून बनाए जाते हैं तथा अनेक रोक-टोक लगाई जाती हैं। जिनका आदर करना चाहिए। पर्यटकों की संख्या पर भी इसीलिए नियंत्रण रखा जाता है। एक सच्चा ईको-टूरिस्ट इन नियम-कानूनों व रोक-टोकों का सादर पालन करना चाहेगा ताकि प्रकृति संरक्षण को योगदान मिल सके।

5. ईको-टूरिज्म की भारत में सम्भावनाएँ :

हमारे देश की जैव विविधता, संस्कृति धार्मिक व ऐतिहासिक स्थल व प्राकृतिक सौन्दर्य को देखते हुए यहां इको पर्यटन की अपार सम्भावनाएँ हैं। हिमालय, पूर्वोत्तर क्षेत्र मरुस्थल, तटलाइन, पट्टार, सुन्दर द्वीप, बड़ी बड़ी नदियाँ, घने वन व भांति-भांति के जीव जन्तु व वनस्पतियाँ सहज ही पर्यटकों को अपनी ओर आकर्षित कर जाते हैं। साहसिक पर्यटन जैसे पर्वतारोहण, रिवर राफ्टिंग, रॉक क्लाइम्बिंग, स्नो स्पोर्ट, हाइकिंग आदि की भी अपार सम्भावनाएँ हैं। विदेशी पर्यटकों को भी उक्त आकर्षण यहां आने के लिए विवश करता है। शहरों की व्यस्त व उबाऊ जिन्दगी से कुछ समय के लिए छुटकारा पाने की ललक भी शहरी लोगों को इको पर्यटन की ओर प्रवृत्त कर रही है। जैव विविधता, प्राकृतिक सौन्दर्य, ग्लोबल वार्मिंग आदि विषयों में दिन प्रतिदिन जागरूकता बढ़ रही है और पढ़ा लिखा व्यक्ति अधिकाधिक प्रकृति की ओर उन्मुक्त हो रहा है। पर्यावरण के प्रति भी युवाओं, विशेषकर विद्यार्थियों की रुचि व ज्ञान बढ़ रहा है। अतः इन अवसरों का लाभ उठाते हुए केन्द्र व राज्य सरकारों तथा प्राइवेट इन्टर प्रोन्यौरो को प्रकृति से सामंजस्य बनाए रखते हुए अधिक से अधिक सुविधाओं और मूलभूत ढांचों का विकास करना चाहिए। साथ ही वन विभाग, पर्यटन विभाग तथा संरक्षित क्षेत्र के प्रबन्धकों को आम जनता को इस दिशा में जागरूक करना चाहिए और अपने व्यवहार व आचरण को भी इको पर्यटन को बढ़ावा देने वाला व दोस्ती भरा व सुविधाजनक बनाना चाहिए।

DHOLE

Dog of the Indian Jungle

A.J.T. Johnsingh

Ka ka khroo...ka ka khroo.....A troop of common langurs, on their early morning foraging trip, mistook me, seated eight metres up in a tree, for a leopard and raised an alarm. A dhole bitch shot out from a rock shelter on a nearby hillock. I froze. Although it stood hardly 15 metres away, the dhole failed to notice me as there was no wind to carry my scent. Having verified that no potential danger lurked around the den site, and that the members of the pack had not returned from their hunt, she went back to the den and her new litter of eight pups. I relaxed. My fear stemmed not from any possibility of aggressiveness on the part of the dholes, but from the fact that they, being extremely shy, would move their pups to another den at the first sign of any disturbance. At around 11.00 a.m. the resting langurs again raised an alarm. This time it was a male dhole returning to the den to regurgitate meat for the nursing female and, as I watched, she ran after him through the rocks and dense thickets whining and wagging her tail.

We were a kilometre and a half from Bandipur, the major tourist centre in the Bandipur Tiger Reserve in South India which lies adjacent to the Mudumalai and Wyand Sanctuaries of Tamil Nadu and Kerala respectively. Gently undulating hills covered with dry deciduous forests and teeming with wildlife, are a constant source of delight to both wildlife enthusiasts and tourists. This area has a long history of conservation behind it dating back to the early half of this century, when the Raja of Mysore, a keen sportsman, photographer and naturalist, passed the Game and Forest Preservation Regulation and paved the way for its protection. Today, Bandipur encompasses most of Venugopal Wildlife Park, and covers a rough area of 690 square km. During my two-year study here as a biologist, my major concern was to assess the role of the dhole as a predator and estimate the effect of dhole predation on the deer population. Many Indian forest officials and naturalists continue to blame the dhole for the decreasing deer population. They conveniently forget that poaching is still prevalent in many areas, habitat destruction, in the form of firewood collection, is rampant and that cattle grazing in many of our jungles has increased dramatically. I also wanted to put to rest some of the many myths that surround dhole biology.

Dholes, or Asiatic wild dogs as they are known, are rust-sand coloured, weigh around 18 kg. and stand approximately 50 cm. at the shoulder. Their length-including a long, black, bushy tail, is about 135cm. Females are somewhat slighter of build but cannot easily be differentiated from males at a distance. The distribution of dholes extends from Saghalien Amurland and the Altai mountains (about latitude 50° north) over the whole of continental Asia (east of longitude 70° east). They occur on the islands of Sumatra and Java but not in Japan, Sri Lanka or Borneo. Of the nine sub-species recognised by Ellerman and Morrison Scott three sub species definitely occur in India. They are *Cuon alpinus primaevus* in Kumaon, Nepal, Sikkim and Bhutan and *Cuon alpinus dukhunensis* south of the Ganges. The dholes found in the Namdapha area in Arunachal Pradesh could well be the *Cuon alpinus* adjusts from North Burma.

Despite numerous first hand accounts, when compared to other pack hunting canids such as the wolf and the African wild dog, the dhole remains little studied and much misunderstood. Even now it carries a stigma with it and until 12 years ago a bounty on its head placed its worth at twenty rupees.

The field work I was doing, with support from the World Wildlife Fund and the Fauna and Flora Preservation Society, England, was the first long-term study of the dhole. However,

the
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facilities and equipment I had, when compared to those normally available to wildlife biologists from the West, were highly inadequate.

I had neither a vehicle nor radio-tele-metry equipment at my disposal. Only two tribals assisted me in locating the dholes and searching for the kills of other predators-the leopard and the tiger. Another major limitation was that elephants prevented me from working at night, at dawn and at dusk. So, early in the morning and evening, the two tribals and I, used to hike in different directions in an attempt to locate our subjects, with the help of the alarm calls of prey such as chital, sambar, langur and peafowl. We systematically combed the scrub on foot and often located the kills by the raucous calls of the ever-present jungle crows. Over a period of time, we assessed the abundance of such cover-seeking animals as sambar, barking deer and wild pig and were thus able to understand more about the predator-prey balance in the jungle. Life in the jungle, inevitably had its moments of danger-especially when in the excitement of following dholes, caution sometimes got thrown to the winds. Once, in a dense lantana scrub, I almost walked into a sleeping cow elephant which I mistook for dead! to verify the cow's condition I gently threw some hard earth at her only to have her come charging out at me with her calf in tow. Another cow elephant once opted to chase the forest department van as I descended from it and in the melee the driver drove off leaving me to deal with the cow! Only my familiarity with the area helped me escape as I jumped into a nearby stream bed. On yet another occasion a tigress with two cubs remonstrated with a terrifying roar as I met them. Less dramatic, but infinitely more irritating, was the problem of ticks in the jungle. After the first few months my body was so completely covered with black itching dots that I looked as if I had a severe attack of small-pox. All through my stay at Bandipur, much to my dismay, I was unable to develop any kind of antidote to tick-bites! When I started my study in August 1976, it took me six full days to just sight my study pack. During those six days I had walked nearly 90 kms. through Bandipur, criss-crossing my study area of 32 square km. and finding nothing more than the tracks of five dholes which had unsuccessfully chased a sambar across a shallow pool. With so little progress, desperation began to set in. My colleagues and the local officials suggested that I had perhaps chosen the wrong animal for my Ph.D.! On the morning of the seventh day however, the tension was relieved when one of my field assistants brought in the lower jaw of a chital stag which had been killed by dholes. That drizzly evening while I was routinely observing sambar from a tree, I suddenly spied my pack in action, 15 dholes in all, killing a chital doe which they had cornered after a chase. The long and slow process of gathering data had begun.

To a casual observer almost all dholes look alike, Nevertheless, there are variations in the rusty, sand-coloured fur and black bushy tail which makes the identification of a few individuals possible. 'Bent Ear' was one such individual I grew to recognise. Old, with a loose hanging scrotum, a bent right pinna (which gave him his name) and a bend in his tail, he appeared to be the leader of the pack. In typical dog-fashion he occasionally showed his dominance by raising one hind leg and urinating onto tree trunks in the presence of the other dholes. However,, he never bullied them. On the contrary, the pack members often greeted him, sometimes even to the extent of crawling under his belly, forcing him to jump aside. 'Bent Ear' was extremely fond of pups and when the pack had made only a small kill the pups would run to him pestering him to regurgitate some extra meat. Like the African wild dog, 'Bent Ear' would oblige them even six or seven hours after he had eaten. I soon developed a strange affection for this aged hunter who flitted freely through the forest. He led a daring life. Alone and unafraid, he slipped easily through the thickets, which I entered with hesitation and, occasionally, fear. When he suddenly disappeared in April 1978. I felt a pang of sadness which stayed with me for a long time.

From the study certain interesting results emerged. I was surprised in the first year when, in the month of November, just prior to the birth of eight pups the pack of 15 was suddenly reduced to

seven or eight animals. (Though there were three females only one gave birth to pups). Later I realised that emigration of a part of the pack before arrival of the pups, and also breeding by only one female, might be the major means of regulating pack size. Also, at no time were two packs seen operating in the same area; which suggested that dholes may be territorial. The focal area of my study pack was nearly twenty square km., an area I grew to know better each time I traversed in on foot.

The pups remained in the den until they were 70-80 days old and during this time did not visit the nearby water-holes. Pack life manifested itself not only in group hunting but also by the participation of all the pack members in feeding the pups. It was a thrill to watch Nature's miraculous learning process at work as the seven-to-eight-month-old pups first began to take an active part in hunting chital and sambar. The dholes; hunting strategies displayed perfect team-work. There seemed to be two basic manoeuvres to flush and kill prey-one by moving through the scrub in an extended line formation and the other by having some of the pack remain on the periphery of the scrub to intercept the fleeing prey disturbed by other members of the pack.

The pack cared for the pups even after they had left the den and until they were four to five months old, the adults treated them with special concern and solicitude. They would hunt either very early in the morning or late in the evening to avoid both the presence of man and the heat of the day. The pups were left in hiding during these hunts and the absence of a couple of adults in the hunting pack even suggested that some animals may have stayed behind to guard them. Eventually, even when the pups started following the pack on hunts, young stragglers were escorted by one or two adults. Pups were permitted to monopolise small kills like chital and when food was insufficient, the adults who had eaten earlier even regurgitated meat for them. At larger kills like sambar which are over twice as large as chital, pups and adults often ate together. When they were seven months old however, and the food was inadequate, adults began to be reluctant to regurgitate food despite the fact that the pups were hungry. Often however, the young ones chased them and appealingly nibbled the corners of their mouths until the elders obliged.

During my many months in Bandipur I made many observations which clearly showed that dholes seldom hunt by relay. During the rush stage of the hunt, dholes are faster than their prey and with their speed and team-work most chases do not last long. Of the 48 chases I witnessed, 44 ended within 500 metres and only twice did the chase go beyond 500 metres. This data disproves the popular theory that dholes chase their prey over great distances in relays thus tiring the quarry but not the pack.

Dholes are not always the super efficient killers they are made out to be. One dry summer evening, while making my way back to Bandipur, a sambar doe trotted across my path followed by a dhole, trailing 70 to 80 metres behind. The dhole, however, appeared to have lost the direction of its prey's movements. I then heard other members of the pack, which had obviously lost sight of both prey and pack member, trying to renew contact with their leader, by their high pitched whistling calls. The next day, with the help of some tribals, I combed the area thoroughly but found no kill. Neither did I see any jungle crows, which are good indicators of a kill. All this told me that the hunt had been a failure.

One March evening my attention was abruptly drawn to a silent struggle between a chital stag with well developed, hard antlers and a group of seven dholes. Two or three dholes were biting and hanging on to the rump of the stag, thereby rendering it completely immobile, while the others worried the flanks. The stag was trying to fight off the dholes by swining its great antlers which never once, however, came in contact with the dogs. Throughout the struggle the dholes remained silent although the deer vocalised its agony three times. Suddenly one dhole caught the snout of the stag and pulled it forward while those at the rump continued to bite and pull it backwards. Eventually, the helpless

stag, was dragged down and the dholes started eating it even before it had died! Although predation is as much a biological process as grazing is, such incidents are often gory and repugnant. However, in defence of the dhole, I recount the opinion of Michael Fox, with whom I first studied this animal. He felt that since dholes lack the killing bite of the large cats, they can best kill prey, larger than themselves, by biting off chunks of meat. An animals thus weakened obviously became easier to overcome as massive blood loss and shock progressively lowered its resistance. Close examination of fresh kills clearly showed that dholes are particular about holding on to the nose of stags sporting hard antlers probably to prevent themselves from being struck by these potential weapons.

An amazing fact about the dhole is its ability to consume large quantities of meat. A pack of 15 could easily eat a yearling sambar male of about 90-100 kg, each animal consuming about five kg. After such a meal the dholes do not hunt for quite some time (even a two kg. morning meal would keep the animals away from another hunt till the next day). This capacity to gorge themselves is believed to enable them to live without food for a few days although this is yet to be verified in the field. One of the benefits of pack life is the efficiency with which kills are eaten. Even the bones and skin of a young deer are swallowed and when larger kills are made, the dholes may even come back to scavenge on the dry stiff skin. Such scavenging makes it possible for the dhole to appropriate kills of leopards and tigers and on many occasions leopards have actually lost their kills to dholes. This stealing of kills from other animals, however, may be dangerous; and I once saw a dhole pup, nearly six months old, killed and partly eaten by a leopard in Bandipur – the potential robber had become the prey.

In Bandipur there was no evidence, however, of either tigers, or leopards regularly competing with dholes over a kill. The ability of each to kill prey of different ages, sex and size enables dholes and the larger predators to coexist. Over 42 per cent of the 19 tiger kills I counted, for instance, were above 100 kg. whereas out of 302 dhole kills only one per cent were of that weight. The obvious deduction is that the tiger prefers larger food items. Dholes also seem to show a preference for male sambar. Out of 10 dhole kills, seven were males. Tigers on the other hand seem to prefer attacking female sambar (this, however, was based on a small sample and before any real conclusions are drawn much more research is necessary). Young chital, being alert and agile, often escaped from dholes. They, however, seemed to fall easy prey to leopards which hunt by stealth and surprise. Another factor that seems to reduce hunting conflicts between the dogs and the great cats, is the fact that dholes are diurnal and prefer relatively open areas, while tigers and leopards are nocturnal and use dense cover from which to launch their attacks.

The dhole's whistle call (which can be imitated by blowing into a medium-bore empty rifle cartridge) would fascinate anyone who heard it in the jungle. How the dhole produces this sound is a complete mystery. Dholes separated from the rest of their pack whistle to reassemble after an unsuccessful hunt and even lone dholes may whistle occasionally to discover the position of other pack members. I have never, however, observed dholes whistling to maintain the cohesiveness of their pack while a hunt was in progress. Sounds play an important role in the lives of dholes and I found that they could be alerted, not only by imitating their whistle, but also by blowing air out through a leaf thus producing a shrill not similar to the distress call of a fawn.

Of the many unusual dhole behaviour patterns I observed, one was the use of communal latrines. One particularly eventual evening (I had the good fortune to spot both a leopard and a magnificent tusker that day) as I sat atop a tree close to a well-frequented jungle trail, I spotted two dholes which came out of the jungle followed by 14 more and they all lay at the crossing nudging one another and whining. Nine of them defecated at the crossing before they left the place in single file led by 'Bent Ear'. This feature of a communal latrine is peculiar to dholes and anyone walking in a jungle, frequented by dholes, will often come across their communal latrines on roads and animal trail crossings. this

habit is not seen in the African wild dog and rarely in wolves; and may well be a display, warning neighbouring packs of the presence of the resident pack. Further, the scats probably aid pack members in tracking their fellow members as also in determining whether an area has been hunted in recently.

During the months of December 1976 and January 1977 I regularly watched 'my' pack caring for the pups and their mother. As February progressed the pups became stronger and their speed and agility increased. I thoroughly enjoyed stalking the playful pups and would freeze for minutes when I felt that the adults had become aware of me. On such occasions I would silently climb a tree to allow the wind to disperse my scent.

Until the evening of February 14, 1977, the dry weather held out and the sound of the pups running and playing over the dry leaves could be heard even 200 metres away. A good evening shower three days later made the leaves soft and damp and the next day I was able to crawl as close as 30 metres to the den to observe the pups, both in morning and evening, without altering the sharp-eared pack.

That evening however, half an hour after my first 'visit' to the den, instead of the anticipated squeals and whines of the pups and the soft growls of the adults, I was confronted with an ominous silence. I knew that the time had come for the pup to leave the den but such a sudden departure took me by surprise. In spite of the many common langurs, chital and grey jungle fowl feeding around the den site. I felt quite alone, almost abandoned in fact. Some alarm calls in the distance, however, suggested that the pack had not gone too far (their home range was around 40 square km.) and I was subsequently able to observe them several times before my departure.

Now, when I think back. I realise that my study, when compared to the magnitude of work done by others on pack-hunting canids, has merely scratched the surface of the vast potential information on dhole biology. Many questions still remain unanswered. Why do dhole populations periodically decline even when there is an adequate supply of prey as in the case of Kanha National Park? What happened to those members of the pack that had emigrated? What was the social status of the emigrant? Does the same dominant female breed every year? What explanation can there be for sambar chasing dholes (I actually saw this happen on more than four occasions) when dholes are capable of killing adult sambar?

The creation of Tiger Reserves has done much to protect the dhole as well, and we can be sure therefore, that like most wild animals, dholes too will do well if left undisturbed. However, a long term study of two or three neighbouring packs, with each individual tagged and some radio-collared, is necessary to learn more about the social and physical characteristics of these, one of the world's most efficient predators. When I conducted my study, neither was I conversant with modern techniques like radio telemetry nor did park 'rules' permit such vitally necessary know-how. Still I hope that the day for such research, which alone can answer the questions raised above, is not far off in India.

All India Tiger Estimation Process

Dr. Y V Jhala*

The methodology for the countrywide population estimation done by National Tiger Conservation Authority and Wild Life Institute of India in collaboration with the Tiger States, undertaken for the first time at such a large scale is summarised as under.

Double Sampling

The entire landscape was sampled at beat level (on an average around 20 sq.km.) for tiger sign indices, ungulate abundance indices and human disturbances. A sub-sample (5% of the tiger occupied landscape in 29 sites) of the landscape was again sampled for absolute density of tiger. This constituted the "double sampling" approach. The indices were then calibrated (regression) against absolute densities, and used for extrapolation in the entire landscape.

Use of logistic regression

Logistic regression is a "generalized linear model" (GLM) for modeling binary response variables against categorical or continuous predictors. It provides a broad frame work for testing the linear models.

The grids showing tiger presence/absence were regressed against covariate data to understand the variables responsible for fostering tiger occupancy, using logistic regression. The misclassified grids were subjected to field verification.

Occupancy modeling

Sampling may result in non-detection of tiger signs in places where tigers may actually be present. The non-detection (false absence) can be addressed by the above double sampling design of replicates survey within each beat. The occupancy modeling resulted in a tiger detection probability between 70-80%, and the covariates which explains tiger occupancy were forest canopy size and condition and prey abundance. Tiger occupancy was negatively influenced by human disturbance indices.

Findings of the refined all India tiger estimation

As per the findings of the recent all India Estimation of Tiger using refined methodology, the total country-level population of tiger is 1411 (mind value); the lower and upper limits being 1165 and 1657 respectively. The recent assessment of tiger population is based on determining spatial occupancy of tigers throughout potential tiger forests and sampling such forests using camera traps in a statistical framework. This assessment is not comparable to the earlier total count using pugmarks owing to several shortcomings in the latter. The new findings indicate a poor status of tiger population in areas outside tiger reserves and protected areas. The tiger population, by and large, in tiger reserves and protected areas of such State are viable, while requiring ongoing conservation efforts.

Project Tiger has put the endangered tiger on an assured path of recovery by saving it from extinction, as revealed by the recent findings of the All India tiger estimation using the refined methodology. This independent report also highlights the achievement of Project Tiger by showing that viable tiger population exists only in Project Tiger areas under the jurisdiction of Project Tiger, while outside populations are highly depleted.

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The recent assessment of tiger population is based on determining spatial occupancy of tigers throughout potential tiger forests and sampling such forests using camera traps in a statistical framework. This assessment is not comparable to the earlier total count using pugmarks owing to several shortcomings in the latter, and hence no comparison regarding trend can be made.

Process

1. Selection of Sites

Landscape categorized into:

High

Medium

Low tiger density (for camera trap surveys)

Delineation based on objective information generated from carnivore sign surveys, plus subjective information from staff

Sites : respective of landscapes

Grid based Approach

2 km x 2 km grid overlaid on the map of the area

At least 1 camera/cell

i.e. 1 camera/4 sq.km.

Within Grid Selection

Intensive reconnaissance surveys (15-30 days) for identifying camera locations.

Locations selected to maximize chances of capture (based on evidences)_

Location GPS reading taken.

Location plotted on a map, design layout finalized.

Placement of Cameras

Trail master TM (1550) used along with Deer Cam

Camera placed at distance of 4 to 6m on both sides from centre of trail.

Camera delay kept at minimum (6 seconds) to minimize chances of missing matching pairs, mother with cub

Pulse rate kept at 5, taking into consideration gait, size

Sensor placed 25-35 cm off ground to capture smaller mammals as well

Effort

Cameras allowed to operate for a month to two months, so as to capture most of the animals in the area.

Consideration: to get good number of recaptures

Cameras deployed in a flexible time frame to optimize on the captures and recaptures

Analysis

All film rolls used in trapping were given unique identity viz. (Block 1/Trap 1/Roll 1) along with date, time, location

Every tiger captured was given a unique identification number viz. (MT-002), after examining stripe pattern on flanks, limbs, forequarters

Following tiger identification, capture histories (X matrix) were developed and analyzed using the programme CAPTURE.

CAPTURE gives various probabilities models of the underlying capture recapture process, that are likely to have generated the observed capture histories.

Analysis of capture history involves comparison between competing models using a series of hypothesis tests and results of an overall discriminant function test, in order to select the most appropriate abundance estimation model.

Assumption: sampled population was demographically and geographically closed during the sampling period.

Density (D) of tiger in the study area was estimated as the population size (N) divided by the effective sampled area (A(w)), where (A(w)) was estimated by creating a polygon over the trapping situations. (A) and a buffer width (w) estimated as half, the mean maximum distance moved (1/2 MMDM) by recaptured tigers added to the camera trap polygon (A)

Projecting Tiger Densities and Estimating Numbers

Exploratory Data Analysis

Simple correlation used to infer patterns and relationships between tiger sign indices, ungulate abundance indices, anthropogenic pressure indices and tiger densities.

Principal component Analysis (PCA)

Some of the above indices were likely to be correlated between themselves, and using them together as predictors in a multiple regimen would result in multi-co-linearity.

To avoid this problem and to extract independent information from each of the predictor indices, apart from promoting parsimony by having fewer variables in regression equation, Principal components were extracted separately for biological variables (tiger sign variables and prey abundance variables/signs of grass/bamboo extraction, lopping, wood cutting, livestock evidence, human trails etc.)

PCA was done for the entire data

Mapping of beats with variables in GIS and superimposing grids

Beats with tiger presence were mapped along with all other variables and Phase I data in GIS domain.

A 10 km x 10 km grid was superimposed on this map

Information regarding predictor variables were extracted and averaged for this grid (100 sq.km).

use of Logistic Regression

This was done to remove ambiguity in the data (field data collected by the Forest Department and the research team). The grids showing tiger presence/absence were regressed against covariate data to understand variables responsible for tiger occupancy. Only the grids which qualified for tiger presence were taken up for density estimation.

Developing a Multiple Regression Density Model:

A multiple regression density model was developed (training) for computing tiger density, viz. $D = \beta + \beta PCA1 + \beta PCA2 + \beta PCA3$ -----

Absolute tiger densities were then regressed using stepwise procedures in SPSS against the regression slope of the Principal Components.

Density Estimation

The multiple regression equation developed for density estimation was run on the entire unknown grids for obtaining density estimates of all grids showing tiger presence (except grids having disagreement between logistic prediction and departmental value).

Tiger Density Prediction

Tiger density were then predicted using regression equation developed using the PCA series at this habitat resolution.

Tiger densities were averaged for grids with contiguous tiger habitat (forest patches separated by less than 5 km of non-forest were considered contiguous).

This average density was multiplied by the area of the contiguous landscape to arrive at the tiger population estimation of that landscape unit.

Separate population of tigers were then added to arrive at a total figure within a landscape unit and State.

Global Warming and Wildlife

Balu Iman

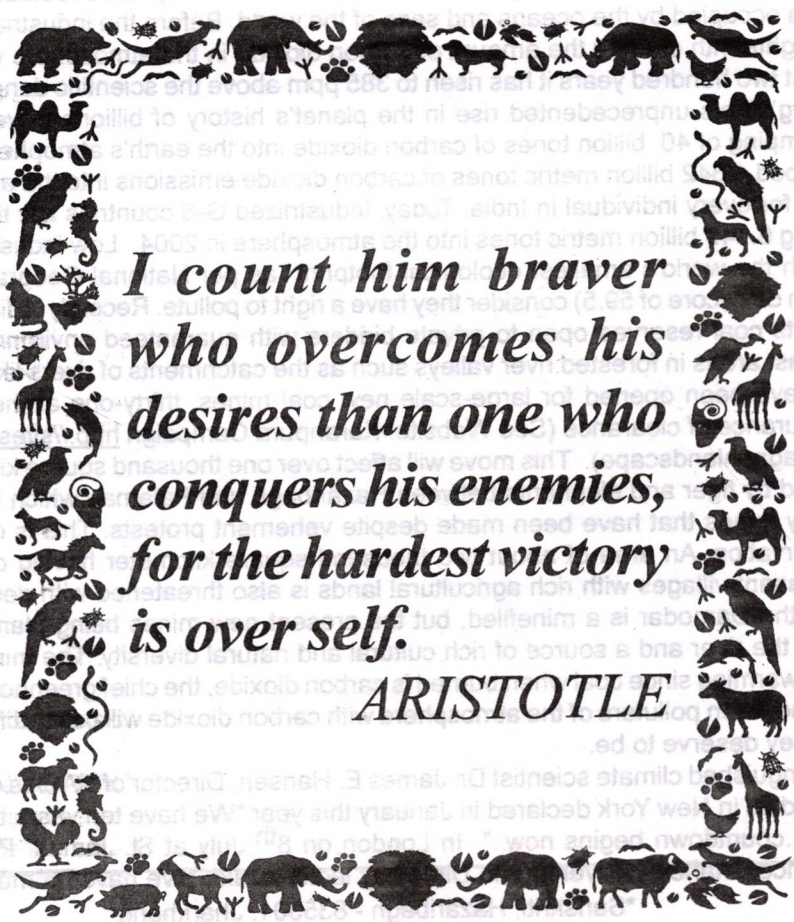
The science behind global warming is no longer questionable. India has been fighting to retain a 2 degree celcius temperature rise (385 ppm) which is at the danger threshold of moving to 400ppm at which scientists like James Lovelock expect a sudden rise to 5 degrees Centigrade which will remain for 200 years. Already global warming at 2 degrees Centigrade rise being currently experienced is drying up forest ecosystems around the world. The jungles are parched and waterless and animals are dying across the nation from thirst and hunger as ecosystems fail to support them. The scientists tell us that the Sun has also warmed up a little (0.05 percent Centigrade), not much it may seem but very considerable when we consider the heat of the Sun which sends fourteen thousand watts of energy to earth every day, enough to power the world's total energy consumption 15,000 times. This causes huge amounts of emissions with no longer forest cover to absorb them. The balance are heat-trapping green house gasses like carbon dioxide. Wildlife is an integral part of the earth's ecosystem. We have seen massive deaths of tigers recently which the conservation lobby attributes to poaching.

The atmosphere, as the late Carl Sagan told us, is as thick as varnish on a football or 500 times less than the area occupied by the oceans and seas of the world. Before the industrial revolution at the end of the eighteenth century the amount of carbon dioxide in the atmosphere was 280 parts per million. In just two hundred years it has risen to 385 ppm above the scientific danger threshold (see www.350.org). This unprecedented rise in the planet's history of billions of years is due to the industrial pumping of 40 billion tones of carbon dioxide into the earth's atmosphere daily, and India in 2004 pumped 1.342 billion metric tones of carbon dioxide emissions into the atmosphere, or 1.2 metric tones for every individual in India. Today, industrialized G-8 countries are the worst polluters the US putting 6.049 billion metric tones into the atmosphere in 2004. Low industrialized countries like India with the world's smallest ecological footprint (as per National Geographic Globe Scan Survey Green dex score of 59.5) consider they have a right to pollute. Recently India has deregulated and offered its coal reserves open to private bidders with guaranteed environmental and forest clearance. Vast areas in forested river valleys such as the catchments of rivers like the Damodar in Jharkhand have been opened for large-scale new coal mines, thirty-one at the last count have received assurance of clearance (See Website: Karanpura Campaign <http://sites.google.com/site/savethebarkagaonlandscape>). This move will affect over one thousand square kilometers of forest corridors used by tiger and elephants between Hazaribagh and Palamau which had already been threatened by mines that have been made despite vehement protests. This is clearly a threat to wildlife preservation. An area of about two thousand square kilometer having over two hundred tribal and peasant villages with rich agricultural lands is also threatened with destruction. Already the valley of the Damodar is a minefield, but the present new mines being planned in the upper catchment of the river and a source of rich cultural and natural diversity. The mines will not only add to global warming since coal when burned is carbon dioxide, the chief greenhouse gas. I believe a day will come when polluters of the atmosphere with carbon dioxide will be tried for crimes against humanity. They deserve to be.

Recently distinguished climate scientist Dr. James E. Hansen, Director of NASA's Goddard Institute for Space Studies in New York declared in January this year "We have ten years to contain climate catastrophe....countdown begins now.." In London on 8th July at St. James' Palace, His Royal Highness Prince Charles, delivering the Dimbleby lecture said, "We have 96 months (8 years) to save

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the planet. Unfortunately the specialised scientists, wildlife experts, conservationists, the indigenous rights groups, all work with separate areas of interest and cannot take a holistic view of what is facing the planet and its living creatures. We are losing 55,000 species a year or 3 every minute. In the past millions of years extinctions never exceeded one in ten thousand years. The writing is on the wall: Indian wildlife will become totally extinct in five years. In the opinion of scientists global warming is real and they predict the south latitudes such as India will be hit first by heat and India may become a parched subcontinent with rainfall patterns changing all over., This will have a profound effect on wildlife and we at WPSI and 'Cheetal' better reflect on this now.



*I count him braver
who overcomes his
desires than one who
conquers his enemies,
for the hardest victory
is over self.*

ARISTOTLE

The Clean Development Mechanism (CDM)

Mohit Gera IFS

Introduction

The Clean Development Mechanism is one of the instruments created by the Kyoto Protocol to facilitate carbon trading. It is the first of the flexible mechanisms to come into effect, with the launch of the regulatory body, the CDM Executive Board in late 2002, and the approval and registration of the first project, based in Brazil, in late 2004.

Hailed as the "Kyoto surprise", the CDM enjoyed unexpected support from developing countries, and was the compromise solution between Brazil's proposed creation of an adaptation fund for climate-vulnerable countries – the Clean Development Fund – and the USA's demand for a market mechanism similar to the Joint Implementation scheme, but with developing countries.

Key to the support was the CDM's explicitly stated twin objectives of not only emissions reductions for industrialised countries, but also accelerated sustainable development in developing nations. These twin goals are emphasized in the Marrakech Accords, which reiterate that a key feature of the CDM should be the successful transfer of environmentally safe technology and knowledge.

What is the CDM?

The CDM may be described as having several roles. It enables industrialized Parties with emissions reductions commitments to efficiently reach their targets, in an economically efficient way. The incentive to invest in projects is created by the different costs of carbon abatement – an industrialized country seeking to reduce emissions domestically is likely to face substantially higher costs, compared to investment in CDM projects to abate emissions overseas.

By providing investment incentives, the CDM acts as an aid to project finance in host countries, encouraging sustainable development through the adoption of cleaner energy sources, or more efficient industrial processes. Host countries which tax the revenue from local projects, as is the case in China, will also be able to build a national fund which may be used for local adaptation to climate change.

The CDM is a project-based financing mechanism, whereby eligible Annex 1 Parties may purchase carbon credits generated by projects hosted in developing non-Annex 1 countries. Such Annex 1 Parties may be purchasing carbon credits to fulfil compliance requirements, or for speculation, as is the case for US companies.

Projects hosted in non-Annex 1 countries, such as Asia, South Africa and South America, may be developed unilaterally, or bilaterally with investment or support from companies and Governments in Annex 1 countries, as long as the project helps the host country meet its own goals for sustainable development, and does not divert overseas development aid away from the country. Although the first 'Commitment Period' of the Kyoto Protocol does not start until 2008, under the CDM, projects can generate emission credits known as Certified Emission Reductions (CERs) from 2000 onwards.

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Who are the key CDM parties?

CDM Executive Board

The CDM is regulated and overseen by the Executive Board, which was established by the Marrakesh Accords during the 7th Conference of the Parties. It comprises 10 board members, with 10 alternates, from industrialized countries with emission reductions commitments (Annex B) as well as non-Annex B countries.

Members serve on the board for a term of two years (maximum of two consecutive terms), with the chair and vice-chair elected by the Executive Board, with one being a member from an Annex B Party and one being a member from a non-Annex B Party. The chair and vice-chair alternate annually between members from Annex B and non-Annex B Parties respectively.

To assist in carrying out its responsibilities, the Executive Board may establish panels or working groups. There are currently five Panels/groups:

- CDM Registration and issuance Team: responsible for assessing requests for registration.
- Meth Panel: responsible for developing guidelines and recommendations on methodologies based on submitted proposals
- Afforestation and reforestation working group: responsible for developing recommendations on affo / refo methodologies in collaboration with the Meth Panel
- Small scale working group: responsible for developing recommendations on small scale methodologies
- Accreditation Panel: responsible for preparing material related to accrediting operational entries.

The long-term future of the CDM is guided by the proceedings of the Conference of Parties, held yearly since 1995 and comprising of delegates from all countries which are Parties to the UNFCCC. Since the entry into force of the Kyoto Protocol in Feb 2005, another annual event, combined with the COP, is the Meeting of the Parties to the Kyoto Protocol. The first COP/MOP was held in Montreal in Dec 2005, and the second COP/MOP2 was held in Nairobi, Kenya in Nov 2006.

Designated National Authorities (DNA)

At a national level, each country involved in the CDM has a Designated National Authority (DNA) responsible for granting approval to local projects which have fulfilled national criteria for sustainable development and with a good chance of succeeding at eventual registration, as well as acting as a focal point for CDM activities. The UNFCCC maintains a list of DNAs and contact persons, and most DNAs will have dedicated websites and online resources.

It is a requirement for parties who have ratified the Kyoto Protocol to specify a DNA – Buyers will require approval from the DNA of the industrialized country DNAs.

If you have a specific interest in a particular country, please contact us for more information on approval processes, updated DNA contacts or general queries.

Designated Operating Entities (DOE)

These are third-party independent parties which act as "auditors" for the CDM project. These companies have to be certified by the CDM Executive Board as Designated Operating Entities (DOE), before they are able to provide this service to project owners. DOEs are responsible for checking and validating the Project Design Document (PDD); this is a technical document which fully describes the CDM project.

Private parties

On the sell-side, these include project owners based in host countries – these are typically entities which own the assets which may be developed into CDM projects e.g. farms, chemical factories, steel plants, cement plants, or state-owned energy companies seeking to develop alternative power generation sources. Project owners may also be the project developers if the CDM activity is related to their core industries – however, there is a growing market here for environmental/technical consultants which advise on implementation, compile the required project documentation, and which manage the bulk of the CDM process. DNAs will typically have a list of recommended consultants which undertake this work locally.

On the buy-side, there are many different types of buyers ranging from public and private utilities, oil companies, investment banks, government programmes and institutional and private hedge funds. While some Buyers approach Sellers directly, others prefer to operate through brokers. Sellers are also likely to be able to access a much wider market of interested buyers through using a CER broker.

Please contact us if you would like to find out more about our financial CER brokerage services.

NGOs

Non-governmental organizations such as the WWF, CDM Watch, and many local non-profit organizations play an important role in promoting and raising awareness of the sustainability of CDM projects. This may be through monitoring listed CDM projects, participating in local and international stakeholder consultations, or taking an active role in project development.

Key issues highlighted by these organizations include the potential impacts of palm oil biomass projects on deforestation, large hydropower on village displacement, and low – quality project documents which do not adequately address local concerns and views.

What are the main project types?

CDM projects can be designed using established guidelines, or if none exist for the project type, guidelines can be established specifically for the project. These guidelines are referred to as a methodology, and must be approved by the CDM Executive Board. Methodologies are split into three main types:

- **Small-scale:** Includes renewables, energy efficiency and other project. Projects must be less than 15MW in the case of energy generation projects to qualify as "small-scale"
- **Non-small-scale methodologies and consolidated methodologies, which combine several different approach:** This category spans project types such as renewable energy, incineration of industrial chemical waste streams such as HFC23 and N2O, methane reduction activities such as landfill and animal waste management, and other types such as energy efficiency.
- **Forestry:** Afforestation / Reforestation, typically remediation of degraded land. Methodologies for avoided deforestation are currently under discussion.

This list of approved methodologies has primarily been driven bottom-up, where project developers originate and design new methodologies based on their CDM projects, and submit it to the regulatory body, the CDM Executive Board, overseen by the UNFCCC, for approval.

Working from the top-down, the CDM Executive Board is also supposed to encourage the submission of such methodologies through a transparent assessment procedure, in a speedy manner.

What are CERs?

CERs, or Certified Emission Reductions, are carbon credits generated by CDM projects which have completed the registration process. Each CER represents the abatement of one tonne of carbon dioxide equivalent, and CERs are only issued by the CDM Executive Board once estimated abatement volumes have been validated independently, and a stringent verification process is in place for ongoing monitoring.

What types of CERs are there?

There are three main types of CERs available in the market:

- **Issued CERs** – These are already generated and issued to projects for emissions abatement already undertaken.

Due to the low-risk involved with issued CERs, issued CERs command a premium to forward streams of CERs, which have yet to be generated and as such carry more risk.

At present, many issued CERs fall into the 'prompt start' category, where in order to kick-start the CDM market, projects were allowed to claim credits for emissions abatement from 1 January 2000 while the eventual rules and regulations were still being finalized in climate negotiations

However, such early projects must submit requests for registration by 31st March 2007, in order to qualify for these retroactive credits. The deadline has already been extended once in order to afford more time for project developers. The registration fee must also be paid by 31st Jan 2007, with the required project documentation submitted in time for uploading to the UNFCCC website by 15th Feb 2007.

- **Forward streams of CERs** – These are credits yet to be generated by projects that are typically under construction, but which are expected to come online in Phase I of the Kyoto Protocol (2008-2012). Such projects may sell expected volumes of CERs throughout their chosen crediting period, with payment by Buyers upon delivery of CERs at an agreed future date, in order to secure a revenue stream. Transactions involving forward streams of CERs are referred to as forward contracts, where a signed agreement binds the Buyer to pay the Seller a pre-arranged amount upon delivery of the CERs at a future date.

Secondary Market CERs – This refers to CERs which are offered with a guarantee of delivery by a rated entity such as a bank or fund. As all project and delivery risk is borne by this entity, as opposed to a standard 'off take contract' with a project, secondary market CERs often command a higher price than those bought directly from a project.

What is the current state of the CDM market?

Several organizations regularly provide updates of the state of the CDM Market. These include the States and Trends of the Carbon Market by the World Bank, IETA, and The Developing CDM Market by the OECD Environment Directorate, Climate Change division (published in May 2006).

Broadly speaking, CDM projects are currently in South America and Asia, although there are several emerging countries in Africa where CDM projects are currently being developed. There is a clear need to focus capacity building in sub-Saharan regions, as highlighted by the 2006 COP/MOP2.

The largest volumes of CERs are being generated by project types such as large-scale chemical processes e.g. HFC-23 destruction, but there are only a handful of these projects. Projects involving renewable energy generation tend to be more modestly-sized, but dominate the project pipeline in terms of number of projects both registered and in development. It is expected that opportunities to develop projects such as HFC-23 will be exhausted within the near future, to be replaced by more expensive options of carbon abatement such as renewable, energy efficiency and process based projects.

Carbon Credit Markets

The Kyoto Protocol creates markets for carbon trading via the Clean Development Mechanism, as well as Joint Implementation. These are global markets with India, China and Brazil leading the CDM potential, and Eastern Europe the JI potential.

With a network of offices throughout the world, TFS Green is well placed to use its wealth of experience in these markets to structure transactions and offer advisory services, from the inception of a project idea through to the negotiation of the Emission Reduction Purchase Agreement (ERPA).

The CDM & JI Business is comprised of team members with experience since the emergence of this field, with expertise in key fields relating to project development from the methodology design phase through to the development of project design documents (PDD), validation and legal advice. TFS Green has successfully brokered across a wide variety of project types, and have represented clients across Asia, South America and Eastern Europe.

For further information on how TFS Green may serve you within the CDM and JI markets, please contact us at emissions@tfsbrokers.com. For specific queries, please contact Lucy Mortimer on +44 207 198 1600.

An Introduction to Joint Implementation

Joint implementation is very similar to the Clean Development Mechanism, and has in fact adopted largely the same methodologies, project cycle, and overall structures. The key difference is that JI is designed to assist industrialized Annex I countries in meeting their targets through investment and development of projects in other Annex I countries. As the host country also has a target under the Kyoto Protocol (unlike CDM host countries), a JI project must reduce emissions against a 'business as usual' baselines, in order to free up Emission Reduction Units (ERUs) to sell.

Emissions from the host country are limited under the KP; JI project reduce emission in the host country and free up part of their total amount (Assigned Amount) which can then be transferred to the investor country in the form of ERUs. These are then subtracted from the host country's allowed emissions, and added to the total allowable emissions of the investor country. JI projects may start from 2000 onwards; however, ERUs can only be used for compliance from 2008, even in the EU ETS.

Key Parties of the Joint Implementation

- Joint Implementation Supervisory Committee (JISC).
- Participant Countries
- Designated Focal Points (DFP)
- Accredited Independent Entities (AIE)

Joint Implementation Supervisory Committee (JISC)

The JISC has tasks and functions similar to the CDM Executive Board – it has a mandate to verify ERUs generated by JI projects, and is comprised of ten members with ten alternates. The ten members of the JISC are comprised of three members from Annex I countries classed as EITs (these are Economies in Transition such as the Russian Federation, the Baltic States, and certain Central and Eastern European States), three members from other Annex I countries, three members from non-Annex I countries, and one member to represent Small Island Developing States.

Participant Countries

To participate in joint Implementation as a host or investor, parties must originate from an Annex I country with emissions caps listed in Annex B to the Kyoto Protocol. This ensures that emissions reduction units (ERUs) generated may be accounted for by transferring units between national registries.

There are two ways ERUs may be generated – Track 1 and Track 2. This is subject to the fulfilment of certain requirements by host country. ERUs may be generated via the Track 1 simplified procedure,

where the host country may verify the ERUs and issue ERUs appropriately. Track 1 requires host countries to have clear processes in place for approving JI projects, monitoring project performance and verifying ERUs generated, compared to the baseline. Host countries must also have a national system to track their greenhouse gas inventory and Assigned Amount Units (AAUs). If a host country is party to the Kyoto Protocol and only fulfils the requirements of having a national registry and an Assigned Amount, ERUs may only be verified using the procedure set out by the JISC procedure, known as Track 2.

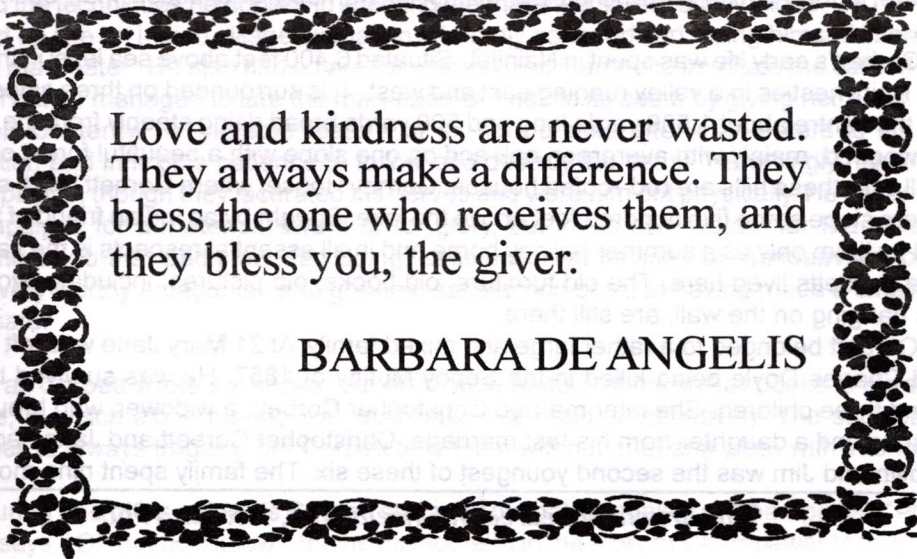
In all cases, a participant country is required to appoint a Designated Focal Point, as well as to submit national guidelines and procedures for approving JI projects.

Designated Focal Points (DFP)

Each participant country is required to appoint a Designated Focal Point, responsible for managing local JI activities. This is the equivalent of the CDM DNA, and is in fact often the same body. At this time, there is no separate list of DFPs, instead, the DNA is the default point of contact for national activities on JI.

Accredited Independent Entities (AIE)

AIEs are independent third-party companies, responsible for validating project documentation and verifying project performance. They are the equivalent of the Designated Operating Entities (DOEs) under the CDM, and in fact DOEs may apply for accreditation to become AIEs, as they perform very similar functions. DOEs which apply for such accreditation may provisionally act as AIEs (within their specialist sectoral scope) until a final decision is taken by the JISC Accreditation Panel, however, all activities undertaken with such provisional status will only become valid once full accreditation is achieved.



Love and kindness are never wasted.
They always make a difference. They
bless the one who receives them, and
they bless you, the giver.

BARBARA DE ANGELIS

*From the Archives of "Cheetal"***Corbett of Kumaon****Walter Luther**

In 1944 there appeared an exciting book on shikar which was destined to be counted among classics of adventure. "Man-Eaters of Kumaon" was an amazing first book which brought sudden fame to its author, Colonel. Edward James Corbett. Now translated into seventeen languages, an introduction to the book is hardly necessary in our day. It has appeared in scores of editions including several paper backs and is read and enjoyed all over the world by millions of people, majority of whom have never pressed a trigger or passed through an Indian jungle.

Corbett was nearing seventy when he sent the manuscript of Man-Eaters of Kumaon to the Oxford University Press. Its author, a modest Anglo Indian, had expected little and never thought that the book of his experiences with the man eating tigers of Kumaon would become a landmark in the world of adventure stories. The publication of this book took the world by the proverbial storm and Corbett, a household name in Kumaon, became known all over the world as the greatest hunter of our time. But Man-Eaters of Kumaon was not just a book on shikar adventures; it was a brilliant study of that most majestic animal of the Indian Forest-the tiger, and a sympathetic understanding of its behaviour under different circumstances.

In Kumaon, which lies in the foothills of the Himalayas, life in the tiny villages situated in the heart of thick forests is simple, lonely, and far removed from all civilization. The appearance of a man-eater near any of these villages can become a terror and dread which words cannot describe. In his story of the Thak man-eater, Corbett tells us that the dread of this single animal not only terrorized the population of villages scattered over an area of fifty square miles, but also held up work of some ten thousand men felling trees in the forest. Again, in Garhwal, for eight years more than fifty thousand villagers lived in nightly fear of the Leopard of Rudraprayag. These villages of Kumaon connected with civilization by dusty paths that ran through thick forests, could send news of man-eaters only through the 'dak-runners' and often the man-eater had time to strike twice or three times before news of one victim reached the District officers. At such times both official and unofficial appeals from the villagers came to Corbett, who spent over three decades in pursuit of man-eaters, during which time he rid the district of Kumaon of a dozen man-eating tigers and leopards.

Corbett's early life was spent in Nainital. Situated 6,400 feet above sea level in the Himalayan foothills, Naini nestles in a valley running east and west. It is surrounded on three sides by hills with a lake in the centre about 1,500 yards long and 500 yards broad rising steeply from the lake the hills are well wooded, mainly with evergreen oak and on one slope with a beautiful forest of Cypressess. Dotted all over these hills are red-roofed houses. Gurney House, where Corbett lived, still stands on the western slope some five hundred feet above the lake. Bought by an Indian friend of the Corbetts, it is used by them only as a summer holiday home and in all essential respects is the same as it was when the Corbetts lived here. The old furniture, old books, old pictures, including two of Corbett's etchings hanging on the wall, are still there.

Corbett belonged to a rather large and mixed family. At 21 Mary Jane was left a widow, her husband Charles Doyle being killed in the Sepoy Mutiny of 1857. He was survived by the young widow and three children. She later married Christopher Corbett, a widower, who brought with him his two sons and a daughter from his first marriage. Christopher Corbett and Jane had six children of their own and Jim was the second youngest of these six. The family spent nine months in Naini where the

This article appeared in Cheetal Vol. 8, No. 2 in 1966

children went to school and Corbett had his early education. In winter the family migrated to their house at Kaladungi. This place at the very foothills was surrounded by thick forest, teeming with game of all sorts, and it was here that Corbett acquired his first love of the jungle. Although he was given lessons in the rudiments of Shikar by his eldest brother, he was essentially a self-taught man. From his early life he showed all the qualities that make a good hunter and was destined for jungle stardom. Endowed with a remarkable power of observation and a keen mind, he was also fearless. As a boy, armed with a muzzle-loading gun, he had roamed these forests day and night and they held no fear for him.

Schooling over, Corbett was compelled to remove himself from his family and from the hills and forests he loved so much. He became Trans-shipment Inspector at Mokameh Ghat. The Ganges river at this place had no railway bridge and the traffic and goods had to be trans-shipped from one side of the river to wagons waiting on the other side. His days were hard working, a routine uninterrupted with holidays even on Sundays. But he worked at this strenuous job for two decades and has devoted the last few chapters of "My India" to the nostalgic memories of Mokameh Ghat.

Corbett served in the two world wars. In 1917 he was commissioned in the Indian Army. Being a man from the hills he had immense physical strength and powers of endurance and acquitted himself well as an officer. It was during this period he helped to raise Labour Force, part of which he took to France. He was passed sixty when the second World War broke out, but 1944 found him a Lieutenant-Colonel in the Indian Army. He was given the difficult job of training men for jungle warfare. He, however, found himself well-equipped to come to terms with this very arduous job, for he had been long in contact with the jungle and possessed all the skill he needed in adapting himself to any emergency and to any situation in it. He set up his camp some ten miles away from Naini Tal. It was an exhausting grind, and Corbett, well advanced in age, lived on his physical capital. He was struck down by serious illness and was laid up for many months.

Corbett remained a bachelor, but he had a constant companion in his siter Maggie, who loved and nursed him devotedly, and her companionship ever enriched his life.

Corbett was a familiar figure in Nainital. He was often seen sitting by the lake with his fishing rod or trolling in a boat. A friend of the rich and the poor, he counted among his acquaintances Governors and poor and simple farmers living in the villages of Kumaon. To these villagers he was a saviour, a friend, a helper, and was held in deep awe and respect by them. He was an adept hunter, and the techniques he applied in shooting the man-eaters were often unique. On two occasions he dressed up like an Indian village woman in a brightly coloured sari, using himself intentionally as a bait for a man-eater. He also had a flare for mimicry and learned to immitate the calls of tigers and leopards. That he managed to lure the man-eater of Thak to its death by giving her a call, is enough proof of his dexterity. A notable feature of all his pursuits after man-eaters is his demomic determination and inflexible patience to follow and destroy the beast. He willingly risked his all for these campaigns, though they lacerated his nerves and wore him out physically. He never undertook these campaigns for a material reward or for glory, but in his own words "for the satisfaction at having done a job that badly needed doing, satisfaction at having out-manoeuvred, on his own ground, a very worthy antagonist; and greatest satisfaction of all, at having made a small portion of the earth safe."

In all Corbett wrote six books. An admirable feature of his shikar books is his simple and direct style, in which alone his stories could have been told so effectively. The subject matter of these stories is always tragedy, but Corbett tells them without grief and often with intense beauty.

During one of his sojourns Corbett stayed in the dak bungalow at Champawat. "I have a tale to tell", he says, "Of that bungalow." But he did not tell it in the story of Champawat Man-Eater, for he

thought "tales beyond the laws of nature" did not consort well with jungle stories. Did Corbett believe in ghosts? He gave no possible explanation for the story of the scream he heard in the night near Thak, but he did assert that it was a very real experience to him. Corbett did write down the story of the dak bungalow at Champwat with many others and was actually contemplating their publication, but for some unknown reason changed his mind.

In 1947 both brother and sister left India and settled down at Nyeri in Kenya. Besides his interest in a coffee estate of which he was a joint owner Africa offered him unlimited scope for animal photography, which had become a passion with him. 'Tree Tops' was very near to his home. It was a hut built on the branches of a great ficus tree, which gave a clear view of a lake and forest where elephants, rhino, leopard, waterbuck and other animals were regular visitors. It provided a place for Corbett to appease his enormous appetite for photographing the wild animals and watching them for hours. His last book "Tree Tops" is an account of the Queen's (then Princess Elizabeth) and the Duke of Edinburgh's visit to this hotel in the trees. Corbett was invited to accompany the Royal visitors.

There are several stories regarding Corbett's death – that he was killed by a lion in Africa, that a snake bit him. These are not true. The arena of the jungle where he played with death so often was also the place where he found peace and fulfilment of his childhood dreams. He loved the jungles and the jungles could not kill its lover. He was privileged to die a peaceful death on 19th April 1955, after a brief heart attack. He now sleeps in the cemetery at Nyeri.

This then, this humble quiet unassuming man, with a tall youth ful frame and blue eyes, was Corbett, one of the greatest hunters of our time, who loved the animals and the birds and God's beautiful out-of-doors, and one who used his courage and talent for the service of his fellow men. He was made an honorary warden in Africa. India rewarded him with the Kaisar-i-Hind Gold medal and gave him the freedom of the forests-a privilege he prized above all titles, (he was also an O.B.E.). And finally, lest his services be forgotten; the Hailey National Park, created in 1935 and named after the then Governor of U.P., was renamed The Corbett National Park. As long as the Ramganga flows through this park, a crystal-clear stream bordered by Shisham trees, as long as sambur, chital, barking deer, elephants and tigers roam in these forests, the name of Corbett will be remembered and will live in the hearts of the Indian people.

*Yes and no are very powerful words. Mean them when
you say them. Respect them when you hear them*

MICHAEL JOSEPHSON

"Cheetal" quarterly News

National Bureau of Fish Genetic Resources Lucknow and Zoological Survey of India Central zone Jabalpur become Life Members of WPSI

During the quarter, National Bureau of Fish Genetic Resources Lucknow and Zoological Survey of India Central Zone Jabalpur converted themselves into the life members of Wildlife Preservation Society of India Dehradun. In addition, the following members joined the society. We welcome the new members and hope their contribution to society will go a long way in strengthening it.

Sl. No.	Name	Type of membership
1.	Sri VEVEK R. SINHA , Flat no. 134, Time Apartments, #268, 6 th Cross, Indira Nagar, 1st stage, Bangalore – 560038, KARNATAKA	Converted to Life Member
2.	Dr. Sangeeta Rawat, Lecturer, U.C.T.B.M.S. W/o Dr. D.S. Rawat, Veterinary officer, Shyampur, P.O. Satya Narain, Distt. Dehradun – 248001 (U.K)	Life Member
3.	Sri. Devidayal, Department of Zoology, Faculty of Science Jai Narain Vyas University, Jodhpur – 342001 (Rajasthan)	Annual Member
4.	Sri. Chena Ram, Department of Zoology, Faculty of Science Jai Narain Vyas University (New Campus) Jodhpur – 342001 (Rajasthan)	Annual Member
5.	Dr. Alok Kumar Srivastava 68/8, "Beena Villa" Sanjay Gandhi Nagar, Nau basti, Kanpur – 208021 (U.P.)	Annual Member
6.	Dr. R.S. Negi 856, Indira Nagar, Post office New Forest – 248006 Dehradun, Uttarakhand	Annual Member
7.	Shivnam Singh, Reader (Rtd.) 114, Amar Singh Pura, Bikaner – 334001 (Rajasthan)	Annual Member

8. Sri. Dependra Singh Rawat,
Rawat Bhawan Agency Mohalla,
Near Jal Nigam, Srinagar Garhwal – 246176 Annual Member
9. Dr. Shivani Sahu,
123/74, Rajpur, Dhakpatti,
P.O. Rajpur, 248009 Dehradun - Uttarakhand Student Member
10. Mr. Shiv Pratap Singh
C/o Sri S.P. Singh, 9A Sewak Ashram Road,
Dehradun – 248001, Uttarakhand Student Member

Mega Colony of ants takes over the world

Scientists from Japan and Spain have discovered that one single mega colony of Argentine ants covers most of the world.

The ants living in vast numbers across Europe, the US and Japan belong to the same inter-related colony, and will refuse to fight one another. The colony may be the largest of its type ever known for any insect species, and could rival humans in the scale of its world domination.

Researchers in Japan and Spain led by Eiriki Sunamura of the University of Tokyo found that Argentine ants living in Europe, Japan and California shared a strikingly similar chemical profile of hydrocarbons on their cuticles, BBC reported.,

Whenever ants from the European and Californian super-colonies and those from the largest colony in Panama came into contact, they acted as if they were old friends.

Source: The Times of India, New Delhi, July 4, 2009

Road Project through Pench Shot down

Widening of NH 7 Will Affect Wildlife: SC Panel

In a boost to wildlife lobby, Supreme Court-appointed Centrally Empowered Committee (CEC) has shot down a controversial proposal of the National Highways Authority of India (NHA) to widen a road passing through Pench Tiger Reserve in M.P. CEC contended that it will be a threat to animals and the fragile ecosystem.

In the report submitted to the apex court last week, the CEC members said the widening of the road connecting Nagpur and Jabalpur from two lanes to four lanes would lead to increase in traffic and this would scare the animals, including endangered species like tigers and gaurs. The animals may also fall victim to speeding vehicles.

The CEC also rejected the NHA's alternative Rs. 600 Crore plan to build 13 bridges and underpass on the route so that wildlife movement is not hampered, a source said.

The highway project, which is a part of the north-south corridor, covers a distance of 8.7 km and passes through the tiger reserve and the contiguous reserve forests. The project was referred to the SC panel after the Wildlife Trust of India moved a petition for stopping the project, saying that road widening would fragment wildlife habitat and restrict movement of already dwindling wildlife population between Pench and Kanha reserves.

The CEC has, however, not sought closing down of the road, but suggested that only light vehicles with restrictions on speed should be permitted. They called for complete ban on night traffic.

For vehicles like buses and trucks, the panel suggested that NHAI can opt for three alternatives suggested by the National Tiger Conservation Authority member Secretary Rajesh Gopal, who was asked to look into the impact of the proposed road project. He had said it would irreversibly damage the tiger habitat and reverse efforts to save the wild cat. In his report to CEC, Gopal had said: "Under no circumstance should the proposal be implemented. The proposed four laning of NH-7 will require removal of 22,482 trees in Maharashtra alone. If implemented, this proposal will cause irreversibile damage to the tiger habitat and its surrounding forest corridors."

Source: The Times of India, New Delhi, July 6, 2009

Plant cataloguing gets easier with DNA 'barcodes'

Washington: An international team of Scientists, including botanists from the University of Toronto, has identified a pair of genes which can be used to catalogue the world's plants using a method known as DNA BARCODING.

DNA barcoding is a rapid and automated classification method that uses a short genetic marker in an organism's DNA to identify it as belonging to a particular species. "Barcoding provides an efficient means by which we can discover the many underscribed species that exist on earth", said Spencer Barrett, a professor of ecology and evolutionary biology at the University of "Toronto and the head of the Canadian plant barcoding working group.

"This discovery is important because understanding biodiversity is crucial to long-term human existence on the planet" he added.

DNA barcoding has been widely used to identify animal species since its investigation five years ago. But, its use for plants was delayed because of the complex nature of plant genetics and disagreements over the appropriate DNA regions to use.

"We compared the performance of the seven leading candidate gene regions against three criteria: ease of obtaining DNA sequences; quality of the DNA sequences; and ability to tell species apart based on a sample of 550 species of land plants," said Barrett. "Based on this global analysis, we recommended the *matK* and *rbcL* - two chloroplast genes are adopted as the DNA barcode for land plants," he added.

The primary application of the methodology will be the identification of the many species in the world's biodiversity hotspots where a shortage of specialists hinders conservation efforts. Other applications include identifying illegal trade in endangered species, identifying invasive organisms, poisonous species and fragmentary material in forensic investigations.

The technique will work on minute amounts of tissue and can be used on fragments of plant material, small seedlings, and in some cases digested or processed samples.

The methodology will also be used immediately in global projects such as Tree-BOL, which aims to build the DNA barcode database for all the species of trees of the world-many of which are of economic and conservation importance.

Source: The Times of India, New Delhi, July 31, 2009

Joining Dots From Kyoto To Copenhagen

1992 Rio Conference produces the UN Framework Convention on Climate Change. Enshrines two principles—"common but differentiated responsibility and duties of countries based on "historical emissions". Says industrialized countries have the responsibility to commit to emission reductions while developing countries should do their best while keeping their development priorities at front. Rich to fully compensate other countries for emission reduction actions.

1997 (Kyoto Protocol accepted. A "tool" within the UNFCCC, it determines fixed targets for emission cuts to be achieved by industrialized countries against **1990** levels. First phase of implementation of protocol is **2008-2012**.

2002 Kyoto becomes operative but US and Australia refuse to ratify.

2007 UN's Intergovernmental Panel on Climate Change Warns crisis is moving imminent, says world must restrain global temperatures from going more than 2 degrees above pre industrial era to have half a chance of preventing irreversible changes on Earth.

At Bali, UNFCCC members seek long-term vision where all countries participate in mitigation, stronger and ambitious targets for industrialized countries and payment of full incremental costs of any actions developing countries may take. State actions of developing countries would be scrutinized for the part that is internationally funded. Countries decide to reach a new "agreed outcome" by

2009 Dec in Copenhagen. Room for US to take reduction commitments outside Kyoto

2008 Recession hits US and other industrialized countries. Obama admin revives Major Economics Forum to push for decisions outside UN talks. Backed by EU and other rich countries, reiterates Bush line that emerging economies must also take obligations to cut emissions. G77 opposes.

PM Manmohan Singh, in a change of stance, says India's per capita emissions shall never rise above the average of the developed countries.

EU, US ask India to reduce emissions "below business as usual" instead of earlier "emission reduction targets"

US unwilling to alter its IPR regime or compensate emerging economics. Same with EU

US begins work on a domestic comprehensive climate bill; India and China, among others, finalize domestic climate change action plans.

2009 US indicates it prefers to take extremely low level of emission reductions and deeper cuts decades later but refuses to sign Kyoto.

EU, US, Japan, and others not keen on compensating unless emerging economics put their national action plans into a new treaty as their obligations.

India blinks at Major Economics Forum meet, weakens link between actions and compensation in terms of finance and technology.

Environment minister Jairam Ramesh suggests India can do without compensation, Offers to put self-funded actions under deep scrutiny.

At Bangkok, EU too ditches Kyoto, backs US' call for a single legal instrument with different commitments from emerging economics and developed nations. US says proposed domestic legislations of countries such as India should be turned into commitments under new legal instrument – referred to as the 'Australian Proposal'. India along with G77 and China vehemently oppose the "murder of Kyoto Protocol"

US says unlikely to commit to emission reduction or finances by Copenhagen in December.

Ramesh writes to the PM, suggesting India should accept Australian Proposal and move away from G77 and not be too argumentative.

Source: The Times of India, New Delhi, October 23, 2009

Latest Climate change fallout: Smaller Sheep

Milder Winters Cause An Average Member of Scottish Herds To Shed Weight by 81 Grams A Year

Washington: Like the wool sweater that emerges from the dryer a size too small, global warming seems to be shrinking sheep.

On average, wild Soay sheep on Scotland's island Hirta are 5% smaller, than they were in 1985, according to a team of researchers led by Tim Coulson of Imperial College London. "The decrease in body size was due to a reduction in growth rates caused, in part, by the changing climate", Coulson said.

The law of evolutionary theory says the brown, thick-coated ungulates should have got progressively bigger. Evolution favours the development of large sheep, which can more easily survive harsh winters, Coulson explained.

So the researchers became curious about the overall decline in size of the animals on Hirta.

The team pored over data for the animals' body size and life history over 24 years. They found that the sheep were not growing as fast as they once did and smaller sheep were likelier to survive into adulthood instead of perishing as lambs. This gives smaller sheep a shot at production, which means that the average sheep size has fallen by 81 grammes per year on average.

In addition, Coulson noted, there is what he termed the "young mum effect", with the younger mothers physically unable to produce large offspring.

The find adds to the understanding of how change occurs in many types of animals, he said, including birds, fish and mammals.

It shows how evolution and ecology each play a role in change. Coulson said: "And that for wild sheep at least, climate change is having a detectable effect on body size—a trait partly determined by genes—and that this complements previous research showing how climate change can influence population size."

"This study addresses one of the major goals of population biology, namely to untangle the ways in which evolutionary and environmental changes influence a species' traits", said Andrew Sugden T, deputy managing editor at Science, which published the report.

Climate change is already having an impact on species. But scientists say it is hard to predict which will be winners and losers from the change, partly because of the complexity of separating out evolutionary pressures from environmental factors.

Source: *The Times of India*, New Delhi, July 5, 2009

LIFE NOT SWEET FOR 'HONEY' BEAR

Depreciation of forest areas has rendered many a wild animal homeless. Consequently, these animals venture in to neighbouring villages and hamlets posing a threat to human life and property. One such animal is the sloth bear that exists in tropical and subtropical forests.

"The sloth bear population is getting increasingly fragmented owing to deforestation. This is not conducive to reproduction, and hence, the overall survival of this species is under threat. In fact, it has been witnessed that in recent times the number of sloth bears found in our forests has significantly reduced due to loss of habitation", says Prakash Chandra Mardaraj, junior research fellow, Wildlife Institute of India.

Shaggy, dusty, and unkempt the reclusive sloth bear makes its home in the forests of South Asia. Emitting noisy grunts and snorts, it wanders alone, usually at night, in search of insects and fresh fruit. They are also known to scale the occasional tree to knock down a bee honeycomb, which they will then enjoy on the ground below. It is this habit that's given rise to their nickname, 'honey bears'. Sloth bears are solitary creatures and generally nocturnal.

Explaining how preservation of sloth bears is important for the ecosystem, Mardraj says, "An ecosystem as we know is a self sustaining community that consists of a dynamic set of living organisms that interact with each other and with the environment. Every action and habit of a particular plant or animal species contributes either directly or indirectly towards maintaining equilibrium or ecological balance. This balance ultimately ensures survival of life. The diet of sloth bears consists mostly of social insects and fruits. These social insects are predominantly ground-living ants and termites that are common and found in large colonies. Now these ants and termites infest sugar-rich fruits and plants that breed essential crops. Their unchecked existence can lead to massive crop destruction and losses for farmers. In other words, sloth bears owing to their insect-feeding habits help in keeping these pests under control."

Mardaraj's research is focussed on how degradation and loss of forests, specially outside-protected areas is causing irreversible damage to human beings and sloth bears and leading to conflicts between them. Elaborating on his research findings, he says, "Degradation of forests that can occur through overgrazing of cattle, tree-felling, fire and over-extraction of forest resources, among other reasons, can have serious repercussions for people who reside in villages neighbouring forests. this is because villagers largely depend on forests for their fuel wood or for fodder for cattle. Also, destruction of forests is leading to depletion of rainwater as well. Consequently, permanent human settlements are arising in arid rangelands that create a need for water development."

He adds further, "Although the direct effect of water on land degradation is relatively limited, the development of water supplies for more intensive use can upset an entire ecosystem. The diminishing forest reserves also lead to loss of corridors between wet and dry season grazing areas that hampers the movement of sloth bears. Hence, sloth bears have to traverse through human settlements to reach grazing land. This phenomenon in recent years is causing growing incidences of conflicts between sloth bears and villagers."

Mardaraj proposes to leverage his research findings to influence the creation of an environmental policy that specifies action points for the preservation and conservation of sloth bears through sustainable and equitable management of natural resources. "This, in turn, will also benefit the human population and mitigate conflict between sloth bears and human beings on a long-term basis", he sums up.

Source: *The Times of India*, New Delhi, July 6, 2009

LION'S SHARE

KAUSHIK BANERJEE, RESEARCH FELLOW AT THE WILDLIFE INSTITUTE OF INDIA, SPEAKS TO PROYASHI BARUA ON HOW MULTIFACETED LANDSCAPE CONSERVATION CAN HELP SAVE ASIATIC LIONS FROM EXTINCTION

In India, lions have been equated with royalty and power since time immemorial. Lions have also influenced the symbols and folklore of Indian culture for over 2,000 years. The Indian lion is another name for the Asiatic lion. These lions are slightly smaller than their African counterparts. Though they have a less well developed mane, Asiatic lions have thicker elbow tufts and a longer tail tuft.

As India's population started growing, an increasing number of forests and scrublands were destroyed to make space for dwellings and crop cultivation. Hence, there was a time when the Asiatic lion was nearly driven to extinction.

The nawab of Junagadh, a local monarch of Gujarat, initiated the first move in terms of conservation of lions by banning lion hunting in his area. This led to a resurgence of the Asiatic lion population in Gujarat. After independence, the Indian government consolidated the conservation policy of the nawab and created the Gir National park and Lion Sanctuary that is collectively known as the Gir Protected Area (PA).

"Though the Gir Protected Area covers 1,400 square kilometers, Asiatic lions are abound within a total area of 10,000 square kilometers", reveals Kausik Banerjee a research fellow at the Wildlife Institute of India.

"Lions have a natural tendency for dispersal. Especially, sub-adult lions are inclined to migrate to a new habitat. As a result, there are several clusters of lion population that exist outside protected areas. These clusters may either be self-sufficient or they may have routine exchanges with the source population. If there is absolutely no interaction with the source population then after a period of time the lions that exist in fragmented clusters will develop a set of characteristics and attributes that may not resonate with their original breed", says Banerjee. "One of my research objectives is to understand the ranging patterns, feeding habits and population demographics of these dispersed clusters of lion populations", he adds.

Banerjee further explains that one of the most intriguing characteristic of lions is that even while they confine most of their activities within the ambit of a particular territory (dwelling) they often venture into unknown terrain. "At times they can even temporarily reside in specific patches of land like wastelands and semi-forests areas that adjoin their habitat. These patches of land that usually occur between forested areas are also the veritable patches wherein lions from cluster groups interact with lions from their source group. Hence, it is extremely important to maintain these patches and routes also called 'lion corridors'. While on one hand this will ensure the long term sustenance of the lion population, on the other hand it will prevent collision and confrontation of lions with the human population", explains Banerjee.

Talking about his research methodology, Banerjee says, "I rely on radio telemetry to track the movement and activities of lions that disperse from their source population. A radio collar is attached to the sub adult lion (that is done by forest experts while the lion is still at Gir PA). A receiver and antennae, engineered to receive satellite signals, is at my disposal. As the lion keep moving, I am automatically updated through the signals I receive."

Banerjee says that while it is a fact that lions thrive both in heavily forested areas and peripheral extensions of human dominated landscapes, the conservation policies are largely geared in maintaining only those lions that live in forest areas.

"Conservation policies need to be oriented towards preservation of these patches and lion corridors. In other words, reserve networks need to be designed in a manner that it facilitates the protected movement of lions over the entire 10,000 square kilometres. Hence, after completing my research I want to make these recommendations to the forest department", concludes Banerjee.

Source: The Times of India, New Delhi, July 27, 2009

The bear necessities

Malcolm Forbes

Andrew Derocher is back after a six-week stay in the Canadian Arctic. Though he doesn't have an accurate estimate, he had made somewhere between 50 and 80 field trips to the Arctic to work on polar bears. Derocher started studying polar bears in 1984. A professor of biological sciences at the University of Alberta, Canada, he has been using polar bears as a means of understanding Arctic ecosystems. Much of his work is applied to conservation and management of polar bears.

This time, Derocher and his team were working from Tuktoyaktuk, capturing polar bears. They fitted 25 GPS satellite collars on the bears. The focus was to identify movement patterns and preferred habitats of the bears. "This information will be used in management plans relative to proposed offshore oil and gas exploration. We will also be comparing recent movement patterns to those observed in the 1980s-1990s. Our research is helicopter-based and we capture the bears by firing a drug filled dart from the helicopter."

Derocher has research ongoing in three different areas of the Canadian Arctic-Western Hudson Bay, Southern Beaufort Sea, and Foxe Basin – all of which are showing effects of climate change. He says, 'We follow the bears by satellite telemetry. We have GPS collars so we know exactly where the bears are six times per-day. We can examine the sea ice conditions in the habitats the bears are using. Part of our research is to monitor the change over time-for example, the time on and off the sea-ice in Hudson Bay. If the ice breaks up very early (in July) the bears are forced ashore, which can have a negative impact on the bears. If freeze-up is delayed, we see more bears coming into the nearby community of Churchill, Manitoba.'

This spring was interesting for Derocher and his team. Compared to the last two years, there was more sea-ice and it looked superficially more like it did 25 years ago when Derocher first went there. The big difference was that the ice was not as thick as it used to be. The Arctic is on track to be very close to the lowest level of sea ice seen (2007 was the minimum). "We found a fair number of bears although many were not in very good body condition. We didn't see many seal kills and I suspect that the bears were having a hard time catching seals," he adds.

In order to ensure a balanced ecology, conservation, and management of large Arctic mammals, especially polar bears, Derocher observes that the main concern is to control human emitted greenhouse gas. What we need, he says, a commitment to dealing with climate change, and development of some technology that can help humans shift to a sustainable means of living.

There are 19 populations of polar bears in the world and over-harvest (hunting) is a problem in about four populations. However, over-harvest is relatively easy to control and management actions are underway. But pollution is a concern and it is clear that being at the top of the food chain puts polar bears in a dangerous position.

Derocher's ongoing research areas include grizzly bears, wolves, caribou, mountain sheep, and peregrine falcons. "All of my research projects are in the Arctic," he says.

As to the kind of impact that his work is likely to have in the future, Derocher says that if polar bears continue to exist and are studied by future generations then he foresees his research having utility in documenting existing patterns in polar bear ecology. However, he adds, "If climate change unfolds, then the future for polar bear research becomes less clear." However, he is optimistic that humans can live in balance with the planet, but as he says, it will take a dedicated effort.

Source: *The Times of India, New Delhi, August 17, 2009*

'No Impact man' leaves no carbon footprint

US Couple's Climate Fight: No Trash, No Electricity, No Cars and Veggies From Local Farms

New Work : Colin beavens so despaired at a lack of political action on climate change that he decided to see what difference he could make by living for a year with as little impact on the environment as possible.

Beavan and his reluctant wife, Michelle Conlin, drastically changed their lifestyle, doing their best not to create trash, cause carbon dioxide emissions or pour toxins into the water supply and by buying only local produce.

The new Yorkers rode bikes to get places, walked up and down the nine flights of stairs to their apartment and cooked meals with wood from a local farmers market. They also got rid of their television and bought no new clothes for themselves or their 18 month old daughter Isabella. Six months into the year, came the most dramatic step – they switched off the electricity.

"It wasn't about being an environmentalist and then doing it. It was about just being a concerned citizen and stumbling forward", Beavan, author of two history books, said. "We jumped in without knowing what we were doing", added Conlin, a writer for *Business Week*.

Beaven has described his experiences in a book, "No Impact Man." A documentary of the same name, directed by Laura Gabbert and Justin Schein, will be released in the US this month.

Beaven and Conlin began their experiment in late 2005 and soon attracted media interest. But along with the attention came criticism that the project was just a stunt.

The couple said the year was hard because US culture is not equipped to support sustainable living. The couple still tries to live sustainably, although not as radically. They still ride bikes, but occasionally take taxis, and they still live without a dishwasher, freezer, and air-conditioner.

Source: The Times of India, New Delhi, September 5, 2009

Himalaya hotspot of climate change

It's 4,000 miles of mountains, seas and valleys from Kathmandu to Copenhagen. With changing climate, it could well become 4,000 miles of sudden storms, flood and climate migrations. Recognising that nations need to pool resources and expertise to face climate change impacts, South Asian countries came together for the first time earlier this week for a climate mini-summit in Kathmandu ahead of the Copenhagen meet in December.

Himalayan ecosystems are 'the hotspots'. That's the message from the two-day South Asian Regional Climate Change Conference. The regions' nations have "come to a bit of understanding: of the climate change challenges that transcend political boundaries, say environmentalists and policy makers. "It's a big first step with a positive outcome.: M.S. Mani, environmental economist at the World Bank, told TOI on phone.

The mighty Himalayas are acutely vulnerable to climate change. "The Himalayas have been warming three times as fast as the world average and their glaciers are shrinking more rapidly than anywhere else and could disappear by 2035. the Ganges and Indus could become seasonal rather than year-round rivers", recently wrote Newsweek's science editor Sharon Begley.

As the source of most of the region's major rivers, changes in Himalayan ecosystems can alter the lives of more than the 700 million who live in the region. Lesser snow and fast-shrinking glaciers mean rivers become trickles and effectively India, Nepal and Bangladesh's water sources drying up. At the same time, coastal areas like Maldives, Bangladesh and Sri Lanka are threatened by rising seas levels.

While most climate summits gear towards ways to reduce carbon emissions and related negotiations, this one was an attempt to see how local communities must be helped to deal with the impact of climate change.

"The Copenhagen summit is a different issue. Here, we looked at a synergistic approach to enhance ability of communities to cope with changing climate", said joint secretary R R. Rashmi, of the ministry of environment and forests in the Indian government. The outcome is a 10 point statement. This spans the range of climate change issues from highlighting the Himalayas as a hotspot to filling knowledge gaps in mountain ecosystems, from pushing for finance of adaptation processes and clean technologies to enhancement of carbon stock.

The Kathmandu meet recognised the Himalayan ecosystem as a hotspot and aimed to ensure the voice of South Asia gets reflected at Copenhagen," says senior fellow at Tata Energy Research Institute, Prosanto Pal.

Source: The Times of India, New Delhi, September 5, 2009

A First, coal-fired plant tries to bury its CO2

Novel Pollution-Control Experiment At American Power Plant Draws Visitors From India and China

Poking out of the ground near the smokestacks of the Mountaineer Power plant here are two wells that look much like those that draw natural gas to the surface. But these are about to do something new: inject a power plant's carbon dioxide into the earth.

A behemoth built in 1980, long before global warming stirred broad concern. Mountaineer is poised to become the world's first coal-fired power plant to capture and bury some of the carbon dioxide it churns out. The hope is that the gas will stay deep underground for all milleniums rather than entering the atmosphere as a heat-trapping pollutant.

the experiment, which the company say could begin in the next few days, is riveting the world's coal-fired electricity sector, which is under growing pressure to develop technology to capture and store carbon dioxide. Visitors from as far as China and India, which are struggling with their own coal-related pollution, have been trooping through the plant.

If all goes smoothly, this week engineers will begin pumping carbon dioxide, converted to a fluid, into a layer of sandstone 7,800 feet below the rolling countryside here and then into a layer of dolomite 400 feet below that.

The liquid will squeeze into tiny pores in the rock, displacing the salty water there, and assume a shape something like a squashed football, 30 to 40 feet high and hundreds of yard long.

American Electric Power's plan is to inject about 100,000 tons annually for two to five years, about 1.5% of Mountaineer's yearly emissions of carbon dioxide. Should congress pass a law controlling carbon dioxide emissions and the new technology proves economically feasible, the company says, it could then move to capture as much as 90% of the gas.

For now the project consisits of the two wells and a small chemical factory. In the factory, smoke diverted from the plant's chimney is mixed with a chilled ammonia based chemical. The chemical is then heated, releasing the carbon dioxide, which is pumped deep into the wells.

Far larger projects for capturing and storing carbon dioxide underground have been under way for several years in Europe and North Africa. But Mountaineer is the world's first electricity plant to capture and store carbon dioxide.

Source: *The Times of India, New Delhi, September 24, 2009*

Scientists Size up neutron Stars

After Chandrayaan-1's discovery of water molecules on the Moon comes another astronomy breakthrough for India. An international group lead by Sudip Bhattacharyya, a 36 year old space scientist at Mumbai's Tata Institute of Fundamental Research, has discovered a way to measure the size of neutron stars.

Before we go any further, what is a neutron star? Speaking to TOI on Monday, Bhattacharyya explained: "To put it simply, it is the final stage of a very massive star. When the massive star burns up its fuel, it collapses to become a neutron star," he said, adding that there are between 100 million and 1,000 million neutron stars in the galaxy. On average, a neutron star is very small – approximately 10 km in diameter – and 10,000 light years from Earth, thus making it extremely difficult to study and measure. Bhattacharyya and his team's research revealed the unsuspected property of x-ray bursts given off by the stars, which led to the discovery that the pattern of X-rays generated might reveal their true size.

"Since these x-rays can not reach the Earth because of a blanket created by the atmosphere, data was collected of more than 900 bursts from 43 neutron stars through a Nasa satellite and transmitted to us," Bhattacharyya said.

The Scientists and his colleagues – Coleman Miller of the University of Maryland and Galloway Monash of the University of Australia – modelled how the temperature of the bursts changed as they faded and found it varied in relation to the radius of the star. The team's research has been accepted for publication in the journal *Monthly Notices of the Royal Astronomical Society*.

Source: *The Times of India, New Delhi, October 7, 2009*

"Cheetal" Young Readers Section

At UN, Yugratna Calls for Sharing mother earth:

Washington : A young girl from India's Gangetic plain, where climate change issues affect everyday life and quotidian tasks such as burning the chulah affect the climate, made a plea for the ages at the United Nations on Tuesday, asking world leaders to show vision and leadership in stopping "those who make mother earth cry."

Thirteen year old Lucknow girl Yugratna Srivastava, whose first name loosely translates as a precious stone for all times, spoke eloquently about the need for the world to stop pillaging the earth in a speech that was cheered by world leaders, including the UN Secretary General Ban Ki Moon.

"Environmental problems do not recognize political boundaries", the young girl, wearing a green and white jacket, told a packed UN audience that included India's external affairs minister S.M. Krishna, environment minister Jairam Ramesh, and senior diplomats Shyam Saran and Nirupama Rao. "We have one mother earth, let us share it." She wanted world leaders to make environment, education compulsory in schools.

But beyond the United Nations decision to invite Yugratna to speak as a representative of the world's youth simmered serious concerns that the climate change issue is heading for a deadlock ahead of the Copenhagen summit in December.

Wealthy nations are reluctant to cut enough emissions to take the world out of the danger zone. While poor and developing countries such as India are refusing to commit to binding caps, saying this would prevent them from growing their economies speedily. There was no indication of any significant change in the positions on Tuesday.

Opening the summit, UN Secretary General Ban Ki Moon said it would "morally inexcusable" not to act, a scolding that prompted both President Obama and China's HU Jintao to acknowledge the reaching an agreement is an important goal, although neither committed to any precise numbers. The US and China are the world's largest emitters of greenhouse gas.

India has been persistently clubbed with China, although its emissions are less than one-fourth of China, and in a subtle effort to put things in perspective, Prime Minister Man Mohan Singh has given the UN session a miss, instead having ministers Krishna and Jairam Ramesh who has very firmly stated that New Delhi will not agree to mandatory emissions target – do the batting.

Source: The Times of India, New Delhi, September 24, 2009



समुद्री घोड़ा क्या है?

समुद्री घोड़ा एक विचित्र प्रकार की मछली है, जिसका सिर घोड़े से मिलता-जुलता है, इसलिए इसका नाम भी समुद्री घोड़ा पड़ गया है, इसका शरीर कड़ा और चिकना होता है और पूंछ सांप जैसी होती है, यह अक्सर गर्म समुद्रों के किनारे समुद्री घास और छोटे-छोटे पौधों के साथ पूंछ की कुण्डली बनाकर चिपका रहता है। इस जंतु की अधिकतर आदतें मछलियों से अलग होती हैं।

संसार में समुद्री घोड़े की लगभग 40 किस्में पाई जाती हैं, इसकी लम्बाई 2.5 सेमी से 30.48 सेमी (1 इंच से 12 इंच) तक होती है। इसकी दोनों आंखें एक दूसरे से स्वतंत्र रूप से काम करती हैं। नर समुद्री घोड़े के पेट पर कंगारू की तरह थैली होती है। मादा इसी थैली में अण्डे देती है। इस थैली में ही अण्डों से बच्चे बनते हैं। अण्डों से बच्चे बनने में लगभग 45 दिन का समय लगता है। इसके बाद नर थैली खोल कर बच्चों को समुद्र में छोड़ देता है। इसके शरीर में एक थैली होती है जिसमें हवा भरी रहती है। इसी से यह पानी में तैरता रहता है। यह मछली खाने के काम नहीं आती है। हां इसके शरीर से चूर्ण बनाए जाते हैं।

समुद्री घोड़ा केवल गर्मियों में ही दिखाई देता है। यह किसी को पता नहीं कि यह जाड़ों में कहां चला जाता है। समुद्री घोड़े को दूसरी मछलियां खाना पसंद नहीं करतीं इसलिए इसे शत्रुओं का खतरा कम ही रहता है।

Fitting in (Birds)

In a thick steamy forest in Silent Valley in Kerala, hornbills, barbets, flocks of parakeets and green pigeons flock to tropical trees to feed on the figs and fruits. In Antarctica, thousands of penguins plunge into the icy waters to gorge on tiny shrimp-like krill; and high in the Himalayan mountains a huge Bearded Vulture carefully scans the valley hoping to spot a meal of bones or rotting meat. In Corbett National Park in North India a Crested Serpent Eagle swoops down on a snake and flies away with it dangling in its talons. From fruit, krill, bones, and meat, to snakes, you will find birds eating all kinds of foods. And you will find birds living almost everywhere.

Habitat Is Home

Like all animals, birds live in habitats that provide them with food, water, shelter, and space to mate, raise their young, and grow. Some birds e.g. Palm Swift, have very specific habitat needs and can live only in certain areas. Others like crows and sparrows are very adaptable and can live in many different types of habitats.



Cuckoo



Crow

Migratory birds such as Rosy Pastors or Blackheaded Gulls, breed in one area and winter in another. Both habitats supply food, water and shelter; but only one is used for raising the young ones.

Adapting to Habitats: Birds inhabiting forests around trunks, branches and dense foliage of To move easily in such surroundings, the ability to twist is essential. Short rounded wings are habitat. Trogons, and many species of thrushes are forest dwelling birds have this adaptation.

Birds inhabiting, dry or desert areas such Bustard, the Houbara, sandgrouse and coursers manage for long periods without water.

Birds that catch fish from water without swimming usually have long legs, that enable them to wade deeper into the water. Long necks and long beaks are other adaptations which help them to grab fish from water. Storks, herons and egrets are birds which have such features.

Birds that obtain food from tangled, floating aquatic vegetation have developed long toes e.g. jacanas and moorhens. These help them in walking on floating vegetation or broad leaves of aquatic plants by distributing their weight over a wider area.

Curlews, godwits and snipes move about in mud, probing for food. These birds have long beaks which are useful in finding food. On land, the Hoopoe, uses its long beak in the same way to obtain food.

Ducks, pelicans and comorants have webbed feet in which their toes are joined by a thin membrane. These act as oars and are used by birds while swimming. Waterbirds like ducks, grebes, coots, pelicans have oil glands which secrete a sticky liquid. Birds smear their feathers with this oil and make the feathers waterproof.

Changing Habitats: With changes in habitats and loss of traditional nesting and roosting places, birds have started to adapt to new "manmade"



Nightjar

have to fly in, out and thickly grown trees. to suddenly turn and required for such a and babblers, which

as the Great Indian are adapted to



Crow

environments. Cavity nesters like Mynas who can no longer find old trees, have started nesting in stacks of wheat straw, or dried crushed sugarcane heaps in the countryside.

Apart from such physical adaptations, birds have other ways of adopting to the conditions, prevailing in their habitats. Some may postpone breeding altogether if circumstances are not favourable, for example in a period of severe drought. Or they may change their traditional breeding grounds and move to other areas where the conditions are favourable.



One such case was that of the Lesser Florican which usually migrate to Gujarat for breeding during monsoon. During 1987 there was severe

drought in Gujarat and Saurashtra, the main breeding area of Lesser Florican. Almost no floricans were seen there then. However, the birds bred in the Rollapadu area of Andhra Pradesh, which was not their traditional breeding area but was a favourable area that year because of good monsoon there.

Amazing Variety: Take a look at the birds in your area. You will see all kinds of different beaks, feet, body shapes and sizes, colours, and behaviour.

You will notice that some birds (e.g. Tailor Birds and bulbuls) are eating insects or fruits, while others (e.g. sparrows and munias) are crunching seeds. You will spot a few (e.g. crow Pheasants) capturing small lizards. You also know that some birds (e.g. Spotted Owlets or Nighjars) feed at night, while others feed in the day.



You know that some birds (e.g. Redrumped Swallows or Dusky Crag Martins) use mud to build their nests: others (e.g. Pigeons, doves) use sticks; some (e.g. Common Mynas, Roseringed Parakeets) nest in holes while others (e.g. partridge, quails) nest on the ground.

Why are birds that live in the same basic habitat so different? (e.g. crows, parakeets and mynas) if all birds looked the same, ate the same food, lived in exactly the same place, and had the same habits, they would all be competing for the same food, water, shelter and space. So instead, birds like all other animals, fill different "niches" in the habitats where they live.

A niche could be described as the "job" of an animal or plant in its habitat. For example the niche of a Common Myna could be described as under.

Omnivorous daytime feeder. Eats fruits, insects, kitchen scraps. has a variety of sharp calls and chatter. Nests in a hole in a tree, wall or ceiling. A confirmed associate of man, following wherever he opens up

new habitations.

Finding a Niche: Adapting to fill a niche doesn't happen overnight-it takes many, many generations for the changes to occur. Sometimes adaptations can happen along with a big change in the environment, such as a volcanic eruption, an ice age, or a major earthquake. Adaptations can also occur when new species arrive on an island, or spread out to a remote area.

Over a period of time those special characteristics that help a bird survive, or ones that do not hinder its survival, get passed along. And even then it takes many, many generations for the trait or characteristic to become common. The principle of "the survival of the fittest" applies to all animals and plants.

Bye-Bye, Birdies

Many birds have a summer home and winter home, and each year they make the same round trip or migration flight from one home to the other. Birds usually migrate to a new habitat to



escape changing seasons. As winter approaches, millions of birds of the central and northern Asia and north-eastern Europe come to India to avoid the harsh winter there.

How Do they Know Where they Are Going? One of the most amazing things about migration is that birds end up in the same places every year. For some birds, that means navigating the right direction over a distance of thousands of kilometres. For example, a Grey Wagtail, a bird ranging from Europe to East Siberia, used to come unerringly to the same small garden in Bandra, a suburb of Mumbai every year for five years.



The question of orientation is the most puzzling one in ornithology. Scientists think that different types of birds use different clues to help them navigate.

Daytime migrants seem to use the sun to point them in the right direction, while many nighttime fliers use the stars as their guide. Other birds rely on landmarks such as mountains, lakes, and rivers to let them know where they are. And some birds seem to use the earth's magnetic pull, and even their hearing, to steer them in the right direction. Scientists think many birds also use a combination of these navigational "tricks" to help them find their way.

How Do they Know When to Go? Most birds that migrate are born with the "drive" to migrate. Their bodies are programmed like a computer, telling them where to go, when to stop, and how to get back. But even though the urge to migrate is instinctive, many scientists think that shorter daylight hours in late summer trigger chemical changes in their bodies that help them physically get ready for the long journey. These chemical changes sometimes trigger moulting as well as the "push" to gain an extra layer of fat.

Often during migration, birds have to fly continuously for hundreds of kilometers without food and rest. In order to provide the energy necessary for such long journeys, the body mechanism of migratory birds begin to collect fat, in the form of an extra layer, prior to migration. This extra fat then serves as a source of energy during migration.

As far as possible migratory birds prefer to follow the coastline and river valleys. If they do have to cross, seas, they do so at the narrowest places, taking advantage to straits or islands in between.

It was once believed that birds don't fly very high during migration. The invention of the radar drastically changed this belief. Not only bigger birds like geese (which were seen flying at 4270m) but even small birds travel at great heights; flocks have been detected on radar as high as 13,000m. In spite of the research being carried out, we still cannot claim that we have solved the mystery of bird-navigation.

Record Holders: The Golden Plover holds the record of non-stop distance flight of 3200 km over North Pacific Ocean, continuously flying from Aleutian Islands to Hawaii in 35 hours in favourable weather conditions.

The Humming bird of North America is just 2-5 cm in size. Its sole food is flower nectar. While migrating south, it crosses the Gulf of Mexico in a single, non-stop flight of nearly 800 km, an amazing feat for such a tiny bird.

The Woodcock, a Himalayan bird, performs a similar non-stop journey course on land, while migrating from the Himalaya, to the Nilgiri in the South.

The arctic Tern tops the list of long distance migrants of the world. After completing its breeding in the Arctic circle, it migrates South and goes to the Antarctic ocean, a one way distance of more than 17,000 km.

Growing Up (Insects)

Most insects hatch from eggs and go through several stages of life. The process of changing from egg to adult is called metamorphosis. (Metamorphosis means "to change"). The activities in this section focus on insect life cycles and how insects change from egg to adult.

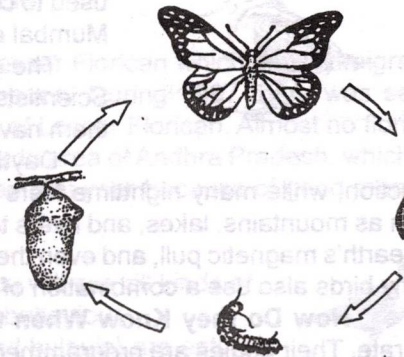
Incomplete Metamorphosis

Some insects go through three life stages: egg to nymph to adult. This is called incomplete, or simple metamorphosis. When the nymphs hatch from eggs, they often look just like miniature copies of their parents, although they don't have wings or fully developed sex organs. (Some insects, such as silverfish, springtails, ants, and termites, are wingless throughout their lives). The nymphs eat and moult, or shed their outer skin, as they grow. Some types of insect nymphs moult only a few times before they become adults; others moult many times. Finally, on the last moult, the wings and sex organs develop and the insect emerges as an adult.

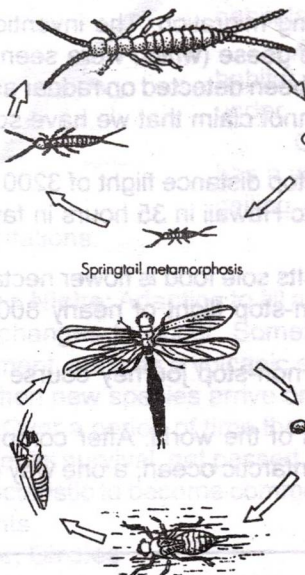
The nymphs of some insects that go through incomplete metamorphosis live in the water and do not resemble the adults, (Nymphs that grow in water are also called naiads). Dragonflies, mayflies, and stoneflies are examples.

Insects that go through incomplete metamorphosis are springtails, silverfish, dragonflies, mayflies, termites, stoneflies, crickets, grasshoppers, mantids, earwigs, cockroaches, lice, true bugs, aphids, cicadas, and thrips.

More advanced insects go through four life stages: egg to larva to pupa to adult. This is called complete metamorphosis.



Butterfly metamorphosis



Springtail metamorphosis

Dragonfly metamorphosis

The young of these insects are called larvae (singular is larva). With these insects, the larvae do not look like the adults. For example, a caterpillar is the larval stage of a butterfly. Larva and adults look very different from one another and eat different foods. During complete metamorphosis the larva will change into a pupa, or resting stage, after its last moult. During the pupal stage the insect slowly goes through many chemical changes that rearrange its whole body structure. When it emerges from the pupal stage, it will be an adult.

Insects that go through complete metamorphosis: lacewings, antilions, butterflies, moths, flies, fleas, ants, bees, wasps, and beetles.

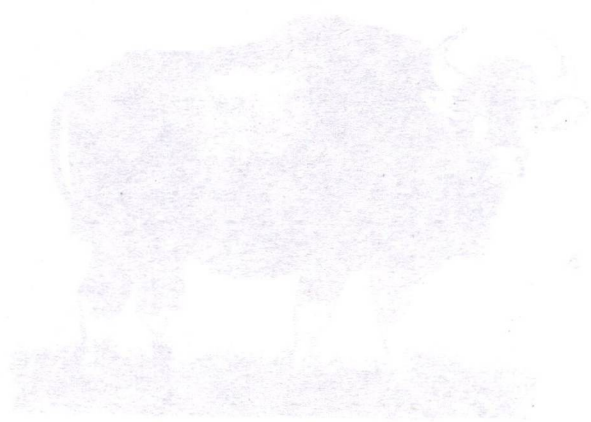
Parthenogenesis

Parthenogenesis, or virgin birth, means development of unfertilized eggs. It occurs in several insects like aphids, locusts, cockroaches, moths, stick insects, honey bees, barklice and thrips. This mode of reproduction is an adaptation to counter situations where males are extremely rare or meeting of different sexes is difficult. In honey bees, the drones or male bees are

born out of the unfertilized eggs, while workers and young queens are born out of the fertilized eggs. **Hermaphrodites:** The Cottony Cushion scale insect is male and female at the same time, which means that it has sex organs of both sexes. the body structure is so arranged that its own sperms can fertilize its own eggs.

Viviparity or live Birth: Though most insects lay eggs, several insects give birth to live young larvae and nymphs. In some cockroaches, the egg case instead of being laid is retained inside the body until the young hatch. Similarly in aphids the eggs hatch inside the female, and live young hatch out. This adaptation is mainly to increase the chances of survival of the next generation. Eggs laid at one place, in the absence of maternal care, are vulnerable to attack from several predators. But the same eggs remain safe if retained inside the mother and the live young when born are able to fend for themselves, thereby increasing their chance of survival.

Aphids are both viviparous and parthenogenetic. That means their eggs proceed to develop without being fertilized, and the young are born live. While the young are developing in the eggs of the mother, the young too have developing eggs in their bodies. So the female aphid is not only an expecting mother but it also an expecting grand mother!



James Edward Corbett 25.7.1875 to 19.4.1955

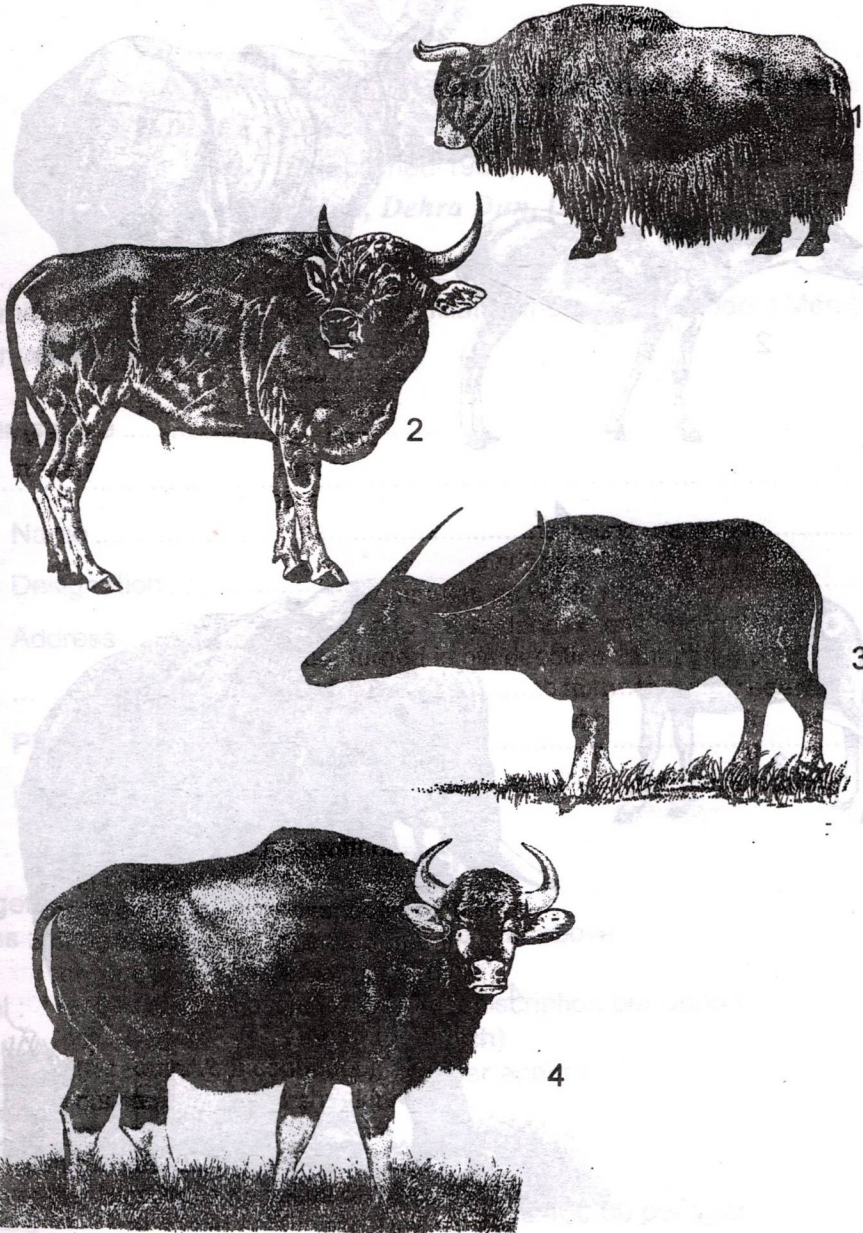
Dr. Prasant Singh*

Hunter turned Conservationist and nature lover. Jim Corbett in his latter years became one of the most outspoken and hardcore naturalist and conservationist. The son of a post master, born with limited resources he went on to create a lucrative business and above all a name for himself in the field of wildlife conservation. He called himself a jungle detective and with the help of pug marks/scratches on the ground/pieces of hair or blood soaked leaves/broken twigs etc. could actually narrate the sequence of events that had taken place on that very spot just a few hours/moments ago. He was our very own Sherlock Holmes of the Terai jungles. Popularly known as "Carpet Saaheb" by the locals he fearlessly defended Choti Haldwani and the adjoining jungles. Once a leopard was shot by a senior Police Officer in an adjoining block. Corbett sent his servant to tell the hunter that he had shot one of HIS leopards. The hunter apologized to Corbett but added "I did not realise that it was your leopard.....because I did not see the collar on him." In those days few could imagine that our tigers (today) would actually need similar (radio) collars to save them from poachers. The drastic fall in the number of tigers in the wild from an estimate 50000 (in the early 1900s) to less than 2000 (today) signifies the amount of destruction we Humans have caused. It is also an indication of the loss of habitat and the drop in numbers of all the other animals which the tiger feeds on. Anyone who has read Corbett's books will recall that Corbett was hunting man-eating tigers at 7000 feet (and more) above sea level in the Himalayan jungles. Today the tiger has been localised to small pockets in few national parks.....where he is far from safe. Sariska and Panna are examples of the same. There is still time to do some thing. So wake up guys and Save this beautiful world.....Before it is too late.

* Medical Officer (Dental) ONGC Hospital, Dehradun

Wildlife Photo Series for Identification

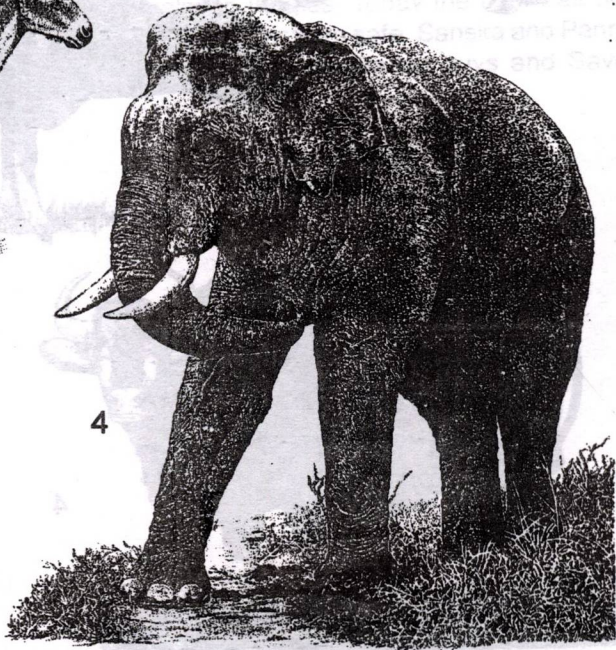
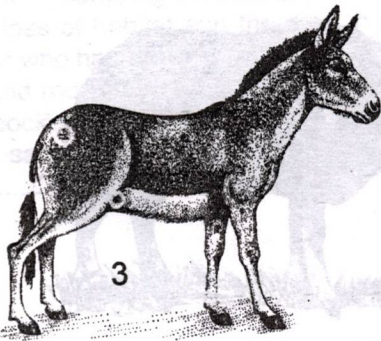
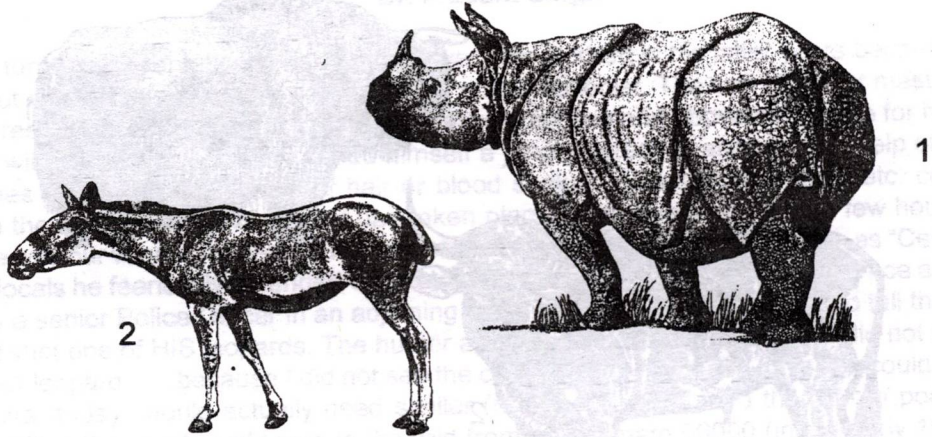
Bovins



1. The Yak *Bos Grunniens* Local Name. Tibetan dong, Brong dong (wild). pegu (domesticated); Hindi ban chour.
2. The Banteng, or Tsaine *Bos banteng* Local Names. Bur, Tsaing; Malay sapi utan.
3. The Wild Buffalo *Bubatus bubatis* Local Names. Hindi arna (male). arnt (female); Mar. jungli mhats; Kan. kadu kona, kartee.
4. The Gaur, or Indian Bison *Bos gaurus* Local Names Hindi gaur, gaur gat; Mar. gavtya, gawa; Kan. kadu yethu, kartee; Tamil Kattu erumat; Mal katu poth; Bur. peeoung

Wildlife Photo Series for Identification

Rhino, Wild Ass & Elephant



1. The Great Indian Onehorned Rhinoceros *Rhinoceros unicornis* Local Names. Hindi gainda, gargadan; Mar genda
2. The Asiatic Wild Ass *Equus hemionus* Khur Local Name Hind ghorkhar
3. The Tibetan Wild Ass *Equus hemionus* kiang
4. The Indian Elephant *Elephas maximus* Local Names Sanskrit hasti gaja; Hindi (Male) hathi (female) hathni; Mar hatti; Tamil anat; Mal ana; Kan. one; Bur. tor sin



APPLICATION FORM

THE WILDLIFE PRESERVATION SOCIETY OF INDIA

(Established 1958)

7, Astley Hall, Dehra Dun, U.A.

I, hereby apply to be admitted as a Patron/Life/Annual/Affiliated/Institutional/Student Member of the Wildlife Preservation Society of India.

My interests are

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Designation

Address

Phone No. & Email

Date of Birth

MEMBERSHIP

All Members get Cheetal (Quarterly) Journal FREE

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| 1. Patrons : | Rs.25000.00 and above |
| 2. Life : | Rs.2500.00 |
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(April to March) |
| 4. Students (School) | Rs.100.00 per annum |
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Societies, NGOs etc.) | Rs.400.00 per year |
| 7. Institutional Life | Rs.3500.00 |

All Communications may please be addressed to the Hony. Secretary.

Signature

The Wildlife Preservation Society of India

1. The aims and objects of the Society are as follows :-

- (a) To promote interest and impart knowledge regarding the preservation and conservation of all forms of wildlife, particularly among the youth of the country.
- (b) To cooperate with the Govt. of India and State Governments and with others Societies and Institutions having similar aims and objects in working for the interests of wildlife.
- (c) To assist in enforcing and actively supporting the Forests Acts. Wild Birds and animals Protections Acts and Rules etc. of State Governments and the Indian Arms Act and Rules in so far as they pertain to wildlife and to bring to the notice of the authorities any infringement of the same and to assist in the detention and prosecution of offenders in respect of such laws.
- (d) To advise and help the Govt. and wildlife administrators in the formation, maintenance and protection of Sanctuaries and National Parks, preservation of wildlife in general and endangered species of India in particular and in the introduction of exotic species into the country, rehabilitation of endangered species etc. and in the formulation and amendments of rules and acts, so as to conserve and increase wildlife stocks.
- (e) To raise funds for carrying out the above aims and objects and to found and maintain museums reading rooms and libraries of natural history in order to disseminate knowledge regarding wildlife.
- (f) To carry out publicity and propaganda for the preservation of wildlife in India by means of monographs, journals, films, filmstrips and other feasible methods.
- (g) To assist members of the Society in obtaining facilities for viewing and photographing wildlife in India.
- (h) To conduct research into the problem of Wildlife management in India, and in pursuance of this, to initiate, encourage and, where possible assist in the projects of the study of threatened species and related objects and to provide reference and research facilities for such work.
- (i) To carry on such other activities which will serve the above subjects.

2. What membership of Wildlife Preservation Society of India will entitle you to ?

- (1) You will become an active member of the growing group of Wildlife enthusiasts, who enjoy working for and spreading the knowledge of how to conserve India's heritage of wildlife for posterity.
- (2) You will be entitled to the full use of the library of the Wildlife Preservation Society and of its reading room.
- (3) You will receive a membership certificate.
- (4) You will receive a personal Identification and Membership Card.
- (5) You will be entitled to buy all publications of the Society at a concessional rate.
- (6) You will be entitled to buy at concessional rates the Societies Greeting Cards, Calendars. Tie, Label badges and the Balance of Nature Game (specially Published in colour for its educative and recreational values).
- (7) You will be supplied "Cheetal", the quarterly journal of the society free.

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